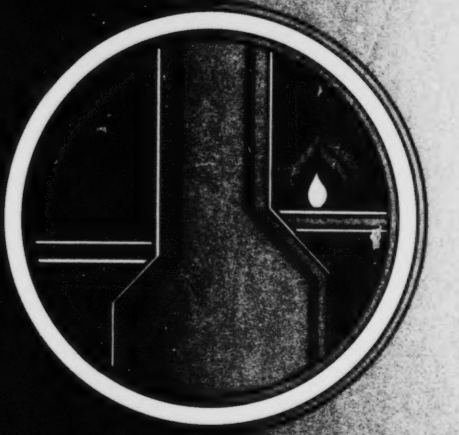
NO. 85-11E

CANMET REPORT



ANALYSIS DIRECTORY OF CANADIAN COMMERCIAL COALS: SUPPLEMENT NO. 6

G.W. BONNELL AND L.C. JANKE

Canada

87-01187/

ANALYSIS DIRECTORY OF CANADIAN COMMERCIAL COALS:

SUPPLEMENT NO. 6

G.W. BONNELL and L.C. JANKE

ENERGY RESEARCH PROGRAM
COAL RESEARCH LABORATORIES

CANMET REPORT 85-11E

MARCH 1986

MICROMEDIA

© Minister of Supply and Services Canada 1986

Available in Canada through

Associated Bookstores
and other booksellers

or by mail from

Canadian Government Publishing Centre
Supply and Services Canada
Ottawa, Canada K1A 0S9

Catalogue No. M 38-13/85-11E Canada: $22.00
ISBN 0-660-12209-X Other Countries: $26.40

Price subject to change without notice

All rights received. No part of this publication may be reproduced, stored in a retrieval system, or transmitted by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the Publishing Services, Canadian Government Publishing Centre, Ottawa, Canada K1A 0S9.

ANALYSIS DIRECTORY OF CANADIAN COMMERCIAL COALS - SUPPLEMENT NO. 6

by

G.W. Bonnell* and L.C. Janke**

SUMMARY

The assessment of Canadian commercial coals was undertaken by independently sampling run-of-mine and cleaned coals at operating mines, preparation plants and coal burning generating stations. Samples were taken by Coal Research Laboratories staff in Calgary, Alberta and Sydney, Nova Scotia during 1984, with the full cooperation of coal operators and users. Sample preparation and analyses were performed at the Energy Research Laboratories in Ottawa and Coal Research Laboratories in Sydney.

Generally, the samples represent production on a specific day, thus the results are broadly indicative, at least, for comparative and screening purposes, of the quality of Canadian commercial coals produced at the time of sampling.

Coals are identified by operator (not necessarily the lease owner), name of mine, seam, coalfield and location. Information is arranged by province and is intended to provide a ready indication of the quality of commercially available coals and to complement coal industry statistics available in other federal and provincial reports. If a more continuous profile of the quality of a specific coal is needed for commercial purposes, then the mine operator should, of course, be contacted.

Most major coal mines, coal preparation plants and coal burning generating stations in Canada were sampled.

---

*Supervising Chemist (Coal Testing Group), Cape Breton Coal Research Laboratory, CRL, Sydney and **Head, Solid Fuels Laboratory, ERL, Ottawa, CANMET, Energy, Mines and Resources Canada.

RÉPERTOIRE DES ANALYSES DES CHARBONS COMMERCIAUX CANADIENS SUPPLÉMENT N° 6

par

G.W. Bonnell* et L. C. Janke**

SOMMAIRE

L'évaluation des charbons commerciaux canadiens a débuté par l'échantillonnage indépendant de charbons tout-venants et de charbons épurés provenant de mines en exploitation, d'installations de préparation et de centrales génératrices alimentées au charbon. En 1984, des échantillons ont été prélevés par les employés des Laboratoires de recherche sur le charbon à Calgary (Alberta) et Sydney (Nouvelle-Écosse) en coopération avec les exploitants et utilisateurs de charbon. La préparation et l'analyse des échantillons a été effectuées aux Laboratoires de recherche sur l'énergie à Ottawa et aux Laboratoires de recherche sur le charbon à Sydney.

En général, les échantillons sont représentatifs de la production d'une seule journée: par conséquent, les résultats sont en grande partie indicatifs, du moins à des fins de comparaison et de classement, de la qualité des charbons commerciaux canadiens produits au moment de l'échantillonnage.

Les charbons sont identifiés par exploitant (lequel n'est pas nécessairement propriétaire de la concession), par la mine, le gîte, la houillère et l'emplacement. Les renseignements sont classés par province et ont pour objet de fournir une indication immédiate de la qualité des charbons commerciaux canadiens disponibles et de compléter les statistiques sur l'industrie du charbon présentées dans d'autres rapports fédéraux et provinciaux. Pour obtenir des renseignements plus complets sur la qualité d'un charbon particulier, s'adresser à l'exploitant de la mine en question.

La plupart des principales houillères, installations de préparation de charbon et centrales génératrices alimentées au charbon au Canada ont été échantillonnées.

---

*Chimiste superviseur (Groupe d'étude sur le charbon), Laboratoire de recherche sur le charbon du Cap-Breton, LRC, Sydney et **Chef, Laboratoires des combustibles solides, LRE, Ottawa, CANMET, Énergie, Mines et Ressources Canada.

CONTENTS

Page

SUMMARY i

SOMMAIRE ii

INTRODUCTION 1

CONVERSION FACTORS 5

COAL ANALYSES - NOVA SCOTIA 7

INVERNESS COALFIELD

Evans Coal Mines Limited

St. Rose Mine (u/g) 8

PICTOU COALFIELD

Pioneer Coal Company Limited (u/g & sfce) 22

SYDNEY COALFIELD

Cape Breton Development Corporation (CBDC)

Lingan Mine (u/g) 34

No. 26 Colliery (u/g) 48

Prince Mine (u/g) 50

Thomas Brogan and Sons Construction Limited

Brogans Mine (sfce) 58

Selminco Inc.

Coal Reclamation Project - Sydney Mines 66

Coal Reclamation Project - New Waterford 68

Pioneer Coal Company Limited (sfce) 70

COAL ANALYSES - NEW BRUNSWICK 77

MINTO COALFIELD

N.B. Coal Limited

Dragline Operations (sfce) 78

Knox Construction Limited

Dragline Operations (sfce) 96

R. Mills Coal Company

Coal Reclamation Project 106

CONTENTS (Cont'd)

Page
COAL ANALYSES - SASKATCHEWAN 111
ESTEVAN COALFIELD
  Bienfait Coal Company Limited
    Bienfait Mine (sfce) 112
  Manitoba and Saskatchewan Coal Company Limited
    Boundary Dam Mine (sfce) 120
  Manalta Coal Limited
    Costello Mine (sfce) (formerly Klimax Mine) 122
    Utility Mine (sfce) 128
  Saskatchewan Power Corporation
    Poplar River Mine 132
COAL ANALYSES - ALBERTA (PLAINS REGION) 137
BATTLE RIVER COALFIELD
  Forestburg Colliery Limited
    Diplomat Mine (Mine No. 1578) (sfce) 138
    Paintearth Mine (Mine No. 1781) (sfce) 148
  Manalta Coal Limited
    Vesta Mine (Mine No. 1046) (sfce) 154
SHEERNESS COALFIELD
  Manalta Coal Limited
    Montgomery Mine (Mine No. 443) (sfce) (formerly Roselyn Mine) 160
WABAMUN COALFIELD
  Manalta Coal Limited
    Highvale Mine (Mine No. 1769) (sfce) 162
    Whitewood Mine (Mine No. 1757) (sfce) 176
COAL ANALYSES - ALBERTA (FOOTHILLS AND MOUNTAIN REGIONS) 191
COALSPUR COALFIELD
  Luscar Limited
    Coal Valley Mine (Mine No. 1778) (sfce) 192
CADOMIN-LUSCAR COALFIELD
  Cardinal River Coals Limited
    Luscar Mine (Mine No. 1768) (sfce) 204

CONTENTS (Cont'd)

Page

Gregg River Resources Limited

Gregg River Mine (sfce) 212

SMOKY RIVER COALFIELD

Smoky River Coal Limited

No. 9 Mine (Mine No. 1774) (sfce) 218

Mine No. 1765/09/B (u/g) 224

Underground and Surface Mines 226

OBED MARSH COALFIELD

Obed Mountain Coal Company

Obed-Marsh Project 230

COAL ANALYSES - BRITISH COLUMBIA 239

CROWSNEST COALFIELD

Byron Creek Collieries Limited

Coal Mountain Mine (sfce) 240

Westar Mining Limited (formerly B.C. Coal Limited)

Michel Underground Mine (u/g) 250

Harmer Surface Mine (sfce) 258

ELK VALLEY COALFIELD

Westar Mining Limited (formerly B.C. Coal Limited)

Greenhills Mine (sfce) 262

Fording Coal Limited

Fording River Mine (sfce) 272

Crows Nest Resources Limited

Line Creek Mine (sfce) 292

PEACE RIVER COALFIELD

Teck Corporation

Bullmoose Mine (sfce) 316

Denison Mines Limited

Quintette Mine (sfce) 336

ACKNOWLEDGEMENTS 346

REFERENCES 347

CONTENTS (Cont'd)

Page

TABLES

1. Summary - classification of coal by rank 348
2. Mines sampled and approximate raw coal production for 1985 349

FIGURES

1. Principal coal mines in Canada 351

INTRODUCTION

CANMET has a national responsibility for assessing the quality and quantity of Canada's commercial coals. Files with chemical and physical data on coal date back to 1910. As well, CANMET (the former Mines Branch) has historically represented Canada's interest in national and international standards work in the subject area of coal and coke quality assessment. As a result there is a steady demand within Canada and from abroad for data and information on the quality of Canadian coals. These enquiries come mostly from potential users of Canadian coals and from various government departments requiring commercial coal quality information for inventory and regulatory purposes.

To meet these needs a series of CANMET reports are published as supplements to the "Analysis Directory of Canadian Commercial Coals". These reports have been published at various intervals since the original issue in 1948 (1,2,3,4,5,6). This supplement covers analyses of coals sampled by CANMET staff in Nova Scotia, New Brunswick, Saskatchewan, Alberta and British Columbia in 1984. All major coal producing sites were sampled, although not all saleable products could be sampled.

Individual data sheets for each sample provide a selection of chemical and physical characteristics and identify the samples with regard to their relevant coalfields, seams and mining districts. The information provides a better understanding of variations in coal quality within and between coalfields. The selected format makes it possible to relate this information to the statistical data and summaries of coal industry developments which appear in various publications and in certain federal and provincial coal reports dealing with production statistics and resource and reserve assessment (7,8,9,10).

Future presentations of analytical data on commercial coal may involve further changes in format that will provide more information consistent with developing concepts and establishing a national coal inventory for Canada. As well, more specific sample location data will be incorporated in future reports.

Sample collection was conducted by staff of the regional laboratories of CANMET's Coal Research Laboratories in Sydney, Nova Scotia and Calgary, Alberta with the cooperation and assistance of mine operators and consumers. Normal mining and preparation plant sampling procedures were followed so that analytical results would be reasonably representative of production at the time of sampling.

Sample preparation facilities of the New Brunswick Electric Power Commission were used for partial preparation of samples from the Minto Coalfield in New Brunswick. Elsewhere, mobile and base facilities of the regional laboratories were used.

Sample preparation and analyses were conducted by qualified, experienced personnel at the Sydney and Ottawa laboratories using standard procedures of the American Society for Testing and Materials (ASTM). Although sampling procedures and analytical results of individual samples must be accorded a high degree of confidence, the frequency and timing of sampling and selection of samples from a variety of sources - seams, conveyors, mine sites, preparation plants and delivery points - mean that the data may only be subjected to statistical analyses with some reservations. It must be understood that individual sample results are not necessarily typical or representative of production over long periods and certainly should not be related to specific contract specification requirements. It is hoped that the chemical and physical information will be useful for purposes such as: considering quality aspects of contract specifications, classifying coal by rank, considering environmental hazards, selecting combustion or conversion processes and, to a limited extent, evaluating coal suitability for metallurgical use. The specific data and their usefulness are discussed briefly below.

The proximate analysis includes mass per cent of moisture, ash, volatile matter and fixed carbon. For low-, medium- and high-volatile A bituminous coals these determinations together with sulphur content and calorific value are presented on the basis of as-received moisture which is characteristically low. However, for high-volatile B and C bituminous, subbituminous and lignite coals, the proximate analysis, sulphur content and calorific value are presented on the basis of equilibrium moisture content.

The as-received moisture is the total of the moisture loss determined on air drying under standard conditions (adherent or surface moisture) and the residual moisture determined as part of the proximate analysis (inherent or oven dried moisture). On the other hand, the equilibrium moisture provides a means of estimating the natural bed moisture exclusive of surface moisture and is essential for classifying low-rank coals.

Data on proximate analysis, sulphur content and calorific value are essential for establishing contract specifications and prices and for quality control of coal deliveries. The moisture, ash and sulphur contents and the calorific value are subject to improvement by appropriate coal preparation techniques used to upgrade the coal. The fixed carbon and volatile matter contents on a dry, mineral-matter-free basis, the heating values on a moisture, mineral-matter-free basis and along with the agglomerating characteristics are used for classifying coals by rank according to ASTM standards (Table 1).

The rank of the coal indicates the degree to which the original organic matter has been metamorphosed by temperature and pressure over time to form lignitic, subbituminous, bituminous or anthracitic coals. Rank is important commercially because, within wide limits, it signifies the potential use of the coal, subject to considerations related to quality factors such as moisture, ash, sulphur and trace element content.

The ultimate analysis presented on a dry basis includes mass per cent of carbon, hydrogen, sulphur, nitrogen, ash and oxygen, the latter obtained by difference from 100%. This elemental analysis is basic to the evaluations of coal for conversion and combustion uses.

The sulphur and trace element contents are important considerations related to power plant emissions and regional or national environmental pollution regulations. As well, sulphur is an unwanted constituent in the manufacture of coke for the metallurgical industry.

The values reported for the trace element analyses represent the total trace element concentration in raw coal as determined using the most recent version of the appropriate standard test method from volume 5.05 of the Annual Book of ASTM Standards. The range of concentration which these procedures cover and the expected variability in analytical results are described in the section on Precision and Bias in each test method. It should be cautioned that no attempt to predict the pathway of these elements in a combustion or conversion process from the bulk analytical results should be made.

Methods for determining arsenic and selenium in coal will soon be incorporated into the ASTM Book of Standards and subsequently can also be incorporated into the Analysis Directory. ASTM standard methods for determining further trace elements are under development.

Sulphur forms reported in this publication are subdivided into three groups: pyritic sulphur, sulfate sulphur and organic sulphur. Sulphur forms are important considerations in coal washability and liquefaction.

Ash fusibility temperatures may be determined in a reducing or oxiding atmosphere and are considered with selecting combustion equipment to avoid or reduce clinkering and slagging problems.

The mineral content of ash is important in furnace design as well as in the design of electrostatic precipitators. Mineral analysis of coal ash together with ash fusibility temperatures allow the prediction of slag viscosity. Mineral analysis of coal ash can also be used to predict the nature of fireside deposits formed in the boiler and characteristics of the fly ash such as electrical resistivity.

The Hardground Grindability Index is an indicator of the energy required to grind a coal to the desired fineness; the lower the index, the more energy required.

The ASTM Free Swelling Index (FSI) is an indicator of the swelling and caking characteristics of coal and is particularly relevant to selecting metallurgical coals.

The coal analyses are arranged by province. Each page contains a three-line heading stating where possible: -name of mine operator (not necessarily the lease owner), -name of mine, seam and coalfield, -mine location by place name, county or district as appropriate and province.

For coal mines in the plains of Saskatchewan and Alberta, locations are often identified in the surveyed municipal land location system by section, township, range and meridian. Mines in Alberta are also identified by numbers assigned by Alberta's Energy Resources Conservation Board.

The approximate annual coal production of the major mines in Canada, in thousands of tonnes, is shown in Table 2 for 1985. Statistics are arranged by province, coalfield and company.

UNITS OF MEASUREMENT

Units of measurement in this report are in the International System of Units (SI) as approved for official use by the Canadian Standards Association and Metric Commission Canada. These units have been adopted by the Mining Association of Canada and the Coal Association of Canada. To assist with the shift to metric units these two associations have published "Metric Practice Guide for the Canadina Mining and Metallurgical Industries", 1978. Listed below are some useful conversion factors along with SI prefixes.

Multiply this		by this	to obtain	
British termal unit	(Btu)	1055.06	joule	J
Btu per pound		2.326	kilojoule per kilogram	kJ/kg
cubic yard	cu yd	0.746 555	cubic metre	m^3
cubic yards per ton		0.842 78	cubic metres per tonne	m^3/t
degrees Celcius	°C	(°C x 9/5) + 32	degrees Fahrenheit	°F
degrees Fahrenheit	°F	(°F - 32) x 5/9	degrees Celcius	°C
foot	ft	0.3048	metre	m
joule	J	0.000 947 8	Btu	
kilogram	kg	2.204 622 6	pound	lb
kilojoule per kilogram	kJ/kg	0.429 923	Btu per pound	
kilometre	km	0.621 371	mile	
litre per second	L/s	13.1982	gallon per minute	gpm
megajoule per kilogram	MJ/kg	429.923	Btu per pound	
metre	m	3.280 84	foot	ft
mile		1.609 344	kilometre	km
pound	lb	0.453 592 3	kilogram	kg
short ton per acre foot		7.354 67	tonne per hectare metre	t/ham
long ton		1.016 046 908 8	tonne	t
short ton		0.907 184 74	tonne	t
tonne	t	0.984 206 5	long ton	
tonne	t	1.102 311	short ton	

COAL ANALYSES – NOVA SCOTIA

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	4-05-84
Sampling location	Mine (u/g)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3181-84

Rank of coal .... High-volatile B bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	5.58		
Ash	%	11.38	12.05	
Volatile	%	34.43	36.47	41.46
Fixed carbon	%	48.61	51.48	58.54
Ultimate:				
Carbon	%	64.11	67.90	77.20
Hydrogen	%	4.10	4.34	4.93
Sulphur (Pyritic)	%	(3.18)	(3.36)	-
(Sulphate)	%	(0.20)	(0.21)	-
(Organic)	%	(3.18)	(3.36)	(3.82)
Total	%	6.54	6.93	-
Nitrogen	%	1.28	1.36	1.55
Ash	%	11.38	12.05	-
Oxygen, by difference	%	7.01	7.42	8.44
Heating value:				
	MJ/kg	27.87	29.51	33.56
	kcal/kg	6656	7049	8015
	Btu/lb	11981	12689	14427

Hardgrove grindability index	54
Free swelling index (FSI)	2.5

Moisture (as rec'd)
Inherent .... %
Adherent .... %

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	979	1321
Spherical	°C	999	1382
Hemispherical	°C	1052	1399
Fluid	°C	1066	1438

Notes:

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	4-05-84
Sampling location	Mine (u/g)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3181-84

Ash analysis, per cent:

SiO2	23.92
Al2O3	10.80
Fe2O3	41.22
Mn3O4	-
TiO2	0.49
P2O5	0.49
CaO	7.12
MgO	1.08
SO3	9.41
Na2O	1.96
K2O	1.05
SrO	-
BaO	0.06
Loss on fusion (LOF)	0.59

Volatile trace element analysis ug/g (ppm)

Hg	0.13
Cl	3300
F	54.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	4-05-84
Sampling location	Mine Dry Screening Plant
Product name	Medium Lump
Screen opening ,mm	152 x 83 ,sq
(Screen opening ,in)	6 x 3 1/4 ,sq
ERL number	3182-84

Rank of coal .... High-volatile B bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	6.54		
Ash	%	11.07	11.84	
Volatile	%	32.73	35.02	39.72
Fixed carbon	%	49.67	53.14	60.28
Ultimate:				
Carbon	%	63.74	68.20	77.36
Hydrogen	%	4.03	4.31	4.89
Sulphur (Pyritic)	%	(3.60)	(3.85)	-
(Sulphate)	%	(0.41)	(0.44)	-
(Organic)	%	(2.86)	(3.06)	(3.47)
Total	%	6.87	7.35	-
Nitrogen	%	1.30	1.39	1.58
Ash	%	11.07	11.84	-
Oxygen, by difference	%	6.46	6.91	7.84
Heating value:				
	MJ/kg	27.71	29.65	33.63
	kcal/kg	6618	7081	8032
	Btu/lb	11912	12746	14457

Hardgrove grindability index		53
Free swelling index (FSI)		2.5
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1004	1385
Spherical	°C	1007	1435
Hemispherical	°C	1013	1441
Fluid	°C	1199	1454

Notes: Equilibrium moisture was calculated from the average of the following samples: 3183-84, 3184-84, 3185-84 & 3186-84

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	4-05-84
Sampling location	Mine Dry Screening Plant
Product name	Medium Lump
Screen opening ,mm	152 x 83 ,sq
(Screen opening ,in)	6 x 3 1/4 ,sq
ERL number	3182-84

Ash analysis, per cent:

SiO2	23.30
Al2O3	8.86
Fe2O3	49.91
Mn3O4	-
TiO2	0.44
P2O5	0.70
CaO	5.12
MgO	0.79
SO3	6.82
Na2O	1.66
K2O	0.64
SrO	-
BaO	-
Loss on fusion (LOF)	0.97

Volatile trace element analysis ug/g (ppm)

Hg	0.16
Cl	2830
F	60.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	4-05-84
Sampling location	Mine Dry Screening Plant
Product name	Egg
Screen opening ,mm	83 x 51 ,sq
(Screen opening ,in)	3 1/4 x 2 ,sq
ERL number	3183-84

Rank of coal .... High-volatile B bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	6.54		
Ash	%	9.21	9.85	
Volatile	%	33.01	35.32	39.17
Fixed carbon	%	51.25	54.83	60.83
Ultimate:				
Carbon	%	65.69	70.29	77.97
Hydrogen	%	4.18	4.47	4.96
Sulphur (Pyritic)	%	(2.87)	(3.07)	–
(Sulphate)	%	(0.24)	(0.26)	–
(Organic)	%	(2.81)	(3.00)	(3.33)
Total	%	5.92	6.33	–
Nitrogen	%	1.29	1.38	1.53
Ash	%	9.21	9.85	–
Oxygen, by difference	%	7.18	7.68	8.52
Heating value:				
	MJ/kg	28.28	30.26	33.57
	kcal/kg	6755	7228	8018
	Btu/lb	12159	13010	14432

Hardgrove grindability index		55
Free swelling index (FSI)		3.5
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1018	1377
Spherical	°C	1021	1438
Hemispherical	°C	1032	1441
Fluid	°C	1216	1454

Notes:

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	4-05-84
Sampling location	Mine Dry Screening Plant
Product name	Egg
Screen opening ,mm	83 x 51 ,sq
(Screen opening ,in)	3 1/4 x 2 ,sq
ERL number	3183-84

Ash analysis, per cent:

SiO2	26.45
Al2O3	10.79
Fe2O3	45.18
Mn3O4	-
TiO2	0.58
P2O5	0.77
CaO	4.57
MgO	0.71
SO3	6.02
Na2O	1.83
K2O	0.87
SrO	-
BaO	0.03
Loss on fusion (LOF)	1.45

Volatile trace element analysis ug/g (ppm)

Hg	0.10
Cl	3040
F	57.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	4-05-84
Sampling location	Mine Dry Screening Plant
Product name	Nut
Screen opening ,mm	51 x 19 ,sq
(Screen opening ,in)	2 x 3/4 ,sq
ERL number	3184-84

Rank of coal .... High-volatile B bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	6.17		
Ash	%	10.24	10.91	
Volatile	%	32.90	35.06	39.35
Fixed carbon	%	50.70	54.03	60.65
Ultimate:				
Carbon	%	64.74	69.00	77.45
Hydrogen	%	4.24	4.52	5.07
Sulphur (Pyritic)	%	(3.63)	(3.87)	-
(Sulphate)	%	(0.24)	(0.26)	-
(Organic)	%	(2.77)	(2.95)	(3.31)
Total	%	6.64	7.08	-
Nitrogen	%	1.31	1.40	1.57
Ash	%	10.24	10.91	-
Oxygen, by difference	%	6.65	7.09	7.96
Heating value:				
	MJ/kg	28.09	29.94	33.60
	kcal/kg	6710	7151	8026
	Btu/lb	12077	12871	14447

Hardgrove grindability index		54
Free swelling index (FSI)		2.5
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1029	1441
Spherical	°C	1041	1446
Hemispherical	°C	1052	1449
Fluid	°C	1218	1452

Notes:

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	4-05-84
Sampling location	Mine Dry Screening Plant
Product name	Nut
Screen opening ,mm	51 x 19 ,sq
(Screen opening ,in)	2 x 3/4 ,sq
ERL number	3184-84

Ash analysis, per cent:

SiO_2	25.09
Al_2O_3	9.95
Fe_2O_3	51.61
Mn_3O_4	-
TiO_2	0.54
P_2O_5	0.54
CaO	3.31
MgO	0.52
SO_3	4.00
Na_2O	1.70
K_2O	0.84
SrO	-
BaO	0.13
Loss on fusion (LOF)	0.55

Volatile trace element analysis ug/g (ppm)

Hg	0.16
Cl	3020
F	51.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	4-05-84
Sampling location	Mine Dry Screening Plant
Product name	Stoker Pea
Screen opening ,mm	19 x 6.4 ,sq
(Screen opening ,in)	3/4 x 1/4 ,sq
ERL number	3185-84
Rank of coal	High-volatile B bituminous

Proximate analysis:	As Rec'd	Dry	Dry Ash Free
Equilibrium moisture .... %	6.87		
Ash .... %	11.38	12.22	
Volatile .... %	32.85	35.28	40.19
Fixed carbon .... %	48.90	52.50	59.81
Ultimate:			
Carbon .... %	63.53	68.22	77.72
Hydrogen .... %	4.07	4.37	4.98
Sulphur (Pyritic) .... %	(3.37)	(3.62)	–
(Sulphate) .... %	(0.23)	(0.25)	–
(Organic) .... %	(2.52)	(2.70)	(3.08)
Total .... %	6.12	6.57	–
Nitrogen .... %	1.29	1.38	1.57
Ash .... %	11.38	12.22	–
Oxygen, by difference ...... %	6.74	7.24	8.25
Heating value:			
MJ/kg	27.58	29.61	33.73
kcal/kg	6587	7073	8057
Btu/lb	11856	12731	14503

Hardgrove grindability index	54
Free swelling index (FSI)	3.0
Moisture (as rec'd)	
Inherent .... %	
Adherent .... %	

Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1021	1368
Spherical .... °C	1032	1429
Hemispherical .... °C	1163	1435
Fluid .... °C	1202	1446

Notes:

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	4-05-84
Sampling location	Mine Dry Screening Plant
Product name	Stoker Pea
Screen opening ,mm	19 x 6.4 ,sq
(Screen opening ,in)	3/4 x 1/4 ,sq
ERL number	3185-84

Ash analysis, per cent:

SiO_2	29.10
Al_2O_3	12.58
Fe_2O_3	43.41
Mn_3O_4	-
TiO_2	0.57
P_2O_5	0.50
CaO	4.04
MgO	0.58
SO_3	4.15
Na_2O	1.43
K_2O	1.45
SrO	-
BaO	0.03
Loss on fusion (LOF)	0.27

Volatile trace element analysis ug/g (ppm)

Hg	0.13
Cl	2960
F	56.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	4-05-84
Sampling location	Mine Dry Screening Plant
Product name	Fines
Screen opening ,mm	Minus 6.4 ,sq
(Screen opening ,in)	Minus 1/4 ,sq
ERL number	3186-84
Rank of coal	High-volatile B bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	6.58		
Ash	%	12.80	13.70	
Volatile	%	32.65	34.95	40.50
Fixed carbon	%	47.97	51.35	59.50
Ultimate:				
Carbon	%	62.73	67.15	77.81
Hydrogen	%	4.04	4.32	5.01
Sulphur (Pyritic)	%	(2.91)	(3.11)	-
(Sulphate)	%	(0.20)	(0.22)	-
(Organic)	%	(2.53)	(2.71)	(3.14)
Total	%	5.64	6.04	-
Nitrogen	%	1.22	1.31	1.52
Ash	%	12.80	13.70	-
Oxygen, by difference	%	6.99	7.48	8.67
Heating value:				
	MJ/kg	26.88	28.78	33.35
	kcal/kg	6421	6873	7964
	Btu/lb	11558	12372	14336

Hardgrove grindability index	54
Free swelling index (FSI)	2.5

Moisture (as rec'd)
Inherent .... %
Adherent .... %

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1035	1299
Spherical	°C	1046	1382
Hemispherical	°C	1188	1393
Fluid	°C	1218	1404

Notes:

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	4-05-84
Sampling location	Mine Dry Screening Plant
Product name	Fines
Screen opening ,mm	Minus 6.4 ,sq
(Screen opening ,in)	Minus 1/4 ,sq
ERL number	3186-84

Ash analysis, per cent:

SiO_2	31.80
Al_2O_3	14.40
Fe_2O_3	33.69
Mn_3O_4	-
TiO_2	0.58
P_2O_5	0.44
CaO	5.02
MgO	1.06
SO_3	6.49
Na_2O	1.42
K_2O	2.00
SrO	0.01
BaO	-
Loss on fusion (LOF)	0.75

Volatile trace element analysis ug/g (ppm)

Hg	0.10
Cl	4430
F	68.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	3-05-84
Sampling location	Trenton Power Station (NSPC)
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3179-84

Rank of coal .... High-volatile B bituminous

Proximate analysis:	As Rec'd	Dry	Dry Ash Free
Equilibrium moisture .... %	6.35		
Ash .... %	11.10	11.85	
Volatile .... %	32.71	34.93	39.62
Fixed carbon .... %	49.84	53.22	60.38
Ultimate:			
Carbon .... %	63.82	68.15	77.31
Hydrogen .... %	4.01	4.28	4.86
Sulphur (Pyritic) .... %	(3.09)	(3.29)	-
(Sulphate) .... %	(0.19)	(0.21)	-
(Organic) .... %	(2.93)	(3.13)	(3.55)
Total .... %	6.21	6.63	-
Nitrogen .... %	1.22	1.30	1.47
Ash .... %	11.10	11.85	-
Oxygen, by difference ...... %	7.30	7.79	8.84
Heating value:			
MJ/kg	27.65	29.52	33.49
kcal/kg	6604	7052	7999
Btu/lb	11887	12693	14399

Hardgrove grindability index	54
Free swelling index (FSI)	3.0
Moisture (as rec'd)	
Inherent .... %	
Adherent .... %	

Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1021	1332
Spherical .... °C	1032	1407
Hemispherical .... °C	1049	1424
Fluid .... °C	1210	1463

Notes: Equilibrium moisture was calculated from the average of the following samples: 3181-84, 3183-84, 3184-84, 3185-84 & 3186-84

EVANS COAL MINES LIMITED
St. Rose Mine; No.5 Seam; Inverness Coalfield
St. Rose, Inverness County, Nova Scotia

Sampling date	3-05-84
Sampling location	Trenton Power Station (NSPC)
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3179-84

Ash analysis, per cent:

SiO_2	28.08
Al_2O_3	11.87
Fe_2O_3	40.81
Mn_3O_4	-
TiO_2	0.49
P_2O_5	0.41
CaO	5.48
MgO	1.07
SO_3	6.34
Na_2O	2.53
K_2O	1.42
SrO	-
BaO	0.11
Loss on fusion (LOF)	1.10

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	2980
F	62.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

PIONEER COAL CO. LTD.
Drummond Colliery; No.1 (Scott) Seam; Pictou Coalfield
Westville, Pictou County, Nova Scotia

Sampling date	3-05-84
Sampling location	Mine (u/g) South side of main slope
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3175-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	2.59		
Ash	%	19.66	20.18	
Volatile	%	24.45	25.10	31.44
Fixed carbon	%	53.30	54.72	68.56
Ultimate:				
Carbon	%	65.88	67.63	84.73
Hydrogen	%	3.99	4.10	5.14
Sulphur (Pyritic)	%	(0.69)	(0.71)	-
(Sulphate)	%	(0.01)	(0.01)	-
(Organic)	%	(0.70)	(0.72)	(0.91)
Total	%	1.41	1.45	-
Nitrogen	%	1.88	1.93	2.42
Ash	%	19.66	20.18	-
Oxygen, by difference	%	4.59	4.71	5.90
Heating value:				
	MJ/kg	27.25	27.98	35.05
	kcal/kg	6509	6682	8371
	Btu/lb	11716	12028	15068

Hardgrove grindability index		60
Free swelling index (FSI)		2.5
Moisture (as rec'd)		
Inherent	%	1.72
Adherent	%	0.87

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1296	1435
Spherical	°C	1418	1482+
Hemispherical	°C	1432	1482+
Fluid	°C	1482+	1482+

Notes: Drummond Colliery was formerly owned and run by Drummond Coal Company Ltd.

PIONEER COAL CO. LTD.
Drummond Colliery; No.1 (Scott) Seam; Pictou Coalfield
Westville, Pictou County, Nova Scotia

Sampling date	3-05-84
Sampling location	Mine (u/g) South side of main slope
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3175-84

Ash analysis, per cent:

SiO2	59.29
Al2O3	23.39
Fe2O3	6.31
Mn3O4	-
TiO2	0.74
P2O5	0.46
CaO	2.04
MgO	1.00
SO3	1.81
Na2O	0.66
K2O	1.91
SrO	0.05
BaO	-
Loss on fusion (LOF)	1.23

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	1760
F	124.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

PIONEER COAL CO. LTD.
Drummond Colliery; No.1 (Scott) Seam; Pictou Coalfield
Westville, Pictou County, Nova Scotia

Sampling date	3-05-84
Sampling location	Mine (u/g) Sampled from coal cars
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3176-84
Rank of coal	High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	3.10		
Ash	%	19.92	20.56	
Volatile	%	23.92	24.68	31.07
Fixed carbon	%	53.06	54.76	68.93
Ultimate:				
Carbon	%	64.94	67.02	84.37
Hydrogen	%	3.87	3.99	5.02
Sulphur (Pyritic)	%	(0.91)	(0.94)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.67)	(0.69)	(0.87)
Total	%	1.58	1.63	–
Nitrogen	%	1.94	2.00	2.52
Ash	%	19.92	20.56	–
Oxygen, by difference	%	4.65	4.80	6.04
Heating value:				
	MJ/kg	26.77	27.63	34.78
	kcal/kg	6394	6598	8306
	Btu/lb	11509	11877	14951

Hardgrove grindability index		58
Free swelling index (FSI)		1.5
Moisture (as rec'd)		
Inherent	%	1.83
Adherent	%	1.27

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1327	1424
Spherical	°C	1399	1471
Hemispherical	°C	1482	1482+
Fluid	°C	1482+	1482+

Notes: Drummond Colliery was formerly owned and run by Drummond Coal Company Ltd.

PIONEER COAL CO. LTD.
Drummond Colliery; No.1 (Scott) Seam; Pictou Coalfield
Westville, Pictou County, Nova Scotia

Sampling date	3-05-84
Sampling location	Mine (u/g) Sampled from coal cars
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3176-84

Ash analysis, per cent:

SiO_2	57.14
Al_2O_3	23.54
Fe_2O_3	9.63
Mn_3O_4	-
TiO_2	0.75
P_2O_5	0.54
CaO	2.15
MgO	0.88
SO_3	1.56
Na_2O	0.44
K_2O	1.68
SrO	0.05
BaO	-
Loss on fusion (LOF)	0.96

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	1720
F	135.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

PIONEER COAL CO. LTD.
Drummond Colliery; No.1 (Scott) Seam; Pictou Coalfield
Westville, Pictou County, Nova Scotia

Sampling date	3-05-84
Sampling location	Trenton Power Station (NSPC)
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3177-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	2.68		
Ash	%	21.69	22.29	
Volatile	%	24.58	25.26	32.50
Fixed carbon	%	51.05	52.45	67.50
Ultimate:				
Carbon	%	63.46	65.21	83.91
Hydrogen	%	3.81	3.91	5.03
Sulphur (Pyritic)	%	(1.88)	(1.93)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.63)	(0.65)	(0.84)
Total	%	2.51	2.58	-
Nitrogen	%	1.86	1.91	2.46
Ash	%	21.69	22.29	-
Oxygen, by difference	%	3.99	4.10	5.28
Heating value:				
	MJ/kg	26.37	27.09	34.86
	kcal/kg	6297	6471	8327
	Btu/lb	11335	11648	14988

Hardgrove grindability index		58
Free swelling index (FSI)		1.5
Moisture (as rec'd)		
Inherent	%	1.72
Adherent	%	0.96

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1132	1285
Spherical	°C	1210	1352
Hemispherical	°C	1293	1371
Fluid	°C	1316	1454

Notes: Drummond Colliery was formerly owned and run by Drummond Coal Company Ltd.

PIONEER COAL CO. LTD.
Drummond Colliery; No.1 (Scott) Seam; Pictou Coalfield
Westville, Pictou County, Nova Scotia

Sampling date	3-05-84
Sampling location	Trenton Power Station (NSPC)
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3177-84

Ash analysis, per cent:

SiO_2	49.08
Al_2O_3	21.44
Fe_2O_3	14.78
Mn_3O_4	-
TiO_2	0.67
P_2O_5	0.67
CaO	4.61
MgO	1.48
SO_3	3.82
Na_2O	0.45
K_2O	1.64
SrO	0.05
BaO	-
Loss on fusion (LOF)	1.37

Volatile trace element analysis ug/g (ppm)

Hg	0.10
Cl	1770
F	143.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

PIONEER COAL CO. LTD.
Drummond Colliery; No.1 (Scott) Seam; Pictou Coalfield
Westville, Pictou County, Nova Scotia

Sampling date	3-05-84
Sampling location	Trenton Power Station (NSPC)
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3178-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	2.65		
Ash	%	20.96	21.53	
Volatile	%	24.34	25.01	31.87
Fixed carbon	%	52.05	53.46	68.13
Ultimate:				
Carbon	%	64.41	66.17	84.33
Hydrogen	%	3.86	3.97	5.06
Sulphur (Pyritic)	%	(0.85)	(0.88)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.57)	(0.59)	(0.75)
Total	%	1.43	1.47	-
Nitrogen	%	1.78	1.83	2.33
Ash	%	20.96	21.53	-
Oxygen, by difference	%	4.90	5.03	6.41
Heating value:				
	MJ/kg	26.61	27.34	34.84
	kcal/kg	6357	6530	8322
	Btu/lb	11442	11754	14979

Hardgrove grindability index		59
Free swelling index (FSI)		2.5
Moisture (as rec'd)		
Inherent	%	1.77
Adherent	%	0.88

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1310	1399
Spherical	°C	1421	1471
Hemispherical	°C	1454	1474
Fluid	°C	1482+	1482+

Notes: Drummond Colliery was formerly owned and run by Drummond Coal Company Ltd.

PIONEER COAL CO. LTD.
Drummond Colliery; No.1 (Scott) Seam; Pictou Coalfield
Westville, Pictou County, Nova Scotia

Sampling date	3-05-84
Sampling location	Trenton Power Station (NSPC)
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3178-84

Ash analysis, per cent:

SiO_2	56.66
Al_2O_3	24.24
Fe_2O_3	7.80
Mn_3O_4	-
TiO_2	0.70
P_2O_5	0.48
CaO	2.42
MgO	0.88
SO_3	2.20
Na_2O	0.52
K_2O	1.83
SrO	0.05
BaO	-
Loss on fusion (LOF)	1.29

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	1690
F	149.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

PIONEER COAL CO. LTD.
Drummond Mine; Acadia Seam; Pictou Coalfield
Westville, Pictou County, Nova Scotia

Sampling date	25-06-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3363-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	4.19		
Ash	%	15.38	16.05	
Volatile	%	26.24	27.39	32.63
Fixed carbon	%	54.19	56.56	67.37
Ultimate:				
Carbon	%	67.97	70.94	84.50
Hydrogen	%	4.45	4.64	5.53
Sulphur (Pyritic)	%	(0.96)	(1.01)	–
(Sulphate)	%	(0.08)	(0.08)	–
(Organic)	%	(0.86)	(0.89)	(1.06)
Total	%	1.90	1.98	–
Nitrogen	%	1.48	1.54	1.83
Ash	%	15.38	16.05	–
Oxygen, by difference	%	4.65	4.85	5.78
Heating value:				
	MJ/kg	27.82	29.03	34.58
	kcal/kg	6644	6934	8260
	Btu/lb	11959	12482	14868

Hardgrove grindability index		62
Free swelling index (FSI)		6.0
Moisture (as rec'd)		
Inherent	%	2.60
Adherent	%	1.59

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1296	1416
Spherical	°C	1396	1457
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

PIONEER COAL CO. LTD.
Drummond Mine; Acadia Seam; Pictou Coalfield
Westville, Pictou County, Nova Scotia

Sampling date	25-06-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3363-84

Ash analysis, per cent:

SiO2	67.00
Al2O3	17.67
Fe2O3	9.27
Mn3O4	-
TiO2	0.97
P2O5	-
CaO	0.18
MgO	0.14
SO3	0.39
Na2O	0.32
K2O	1.60
SrO	0.02
BaO	0.01
Loss on fusion (LOF)	0.47

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	390
F	60.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

PIONEER COAL CO. LTD.
Drummond Mine; Scott Seam; Pictou Coalfield
Westville, Pictou County, Nova Scotia

Sampling date	5-07-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3492-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	4.70		
Ash	%	46.98	49.30	
Volatile	%	19.85	20.83	41.08
Fixed carbon	%	28.47	29.87	58.92
Ultimate:				
Carbon	%	36.07	37.85	74.65
Hydrogen	%	2.51	2.63	5.19
Sulphur (Pyritic)	%	(4.28)	(4.49)	–
(Sulphate)	%	(0.33)	(0.35)	–
(Organic)	%	(0.51)	(0.53)	(1.05)
Total	%	5.13	5.38	–
Nitrogen	%	0.87	0.91	1.79
Ash	%	46.98	49.30	–
Oxygen, by difference	%	3.75	3.93	7.75
Heating value:				
	MJ/kg	15.28	16.04	31.63
	kcal/kg	3650	3830	7554
	Btu/lb	6570	6894	13598

Hardgrove grindability index		62
Free swelling index (FSI)		0.5
Moisture (as rec'd)		
Inherent	%	2.27
Adherent	%	2.43

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1202	1388
Spherical	°C	1371	1452
Hemispherical	°C	1457	1482+
Fluid	°C	1482	1482+

Notes:

PIONEER COAL CO. LTD.
Drummond Mine; Scott Seam; Pictou Coalfield
Westville, Pictou County, Nova Scotia

Sampling date	5-07-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3492-84

Ash analysis, per cent:

SiO2	51.21
Al2O3	24.90
Fe2O3	15.61
Mn3O4	–
TiO2	0.81
P2O5	0.08
CaO	0.40
MgO	1.24
SO3	0.66
Na2O	0.26
K2O	3.32
SrO	0.03
BaO	–
Loss on fusion (LOF)	0.31

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	130
F	394.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	8-05-84
Sampling location	Seaboard Power Station (NSPC)
Product name	23 Thermal Coal (Fines)
Screen opening ,mm	Minus 24 mesh
(Screen opening ,in)	
ERL number	3196-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	8.19		
Ash	%	3.89	4.24	
Volatile	%	33.21	36.17	37.78
Fixed carbon	%	54.70	59.59	62.22
Ultimate:				
Carbon	%	74.74	81.41	85.01
Hydrogen	%	4.82	5.25	5.48
Sulphur (Pyritic)	%	(1.03)	(1.12)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.54)	(0.59)	(0.61)
Total	%	1.58	1.72	–
Nitrogen	%	1.73	1.88	1.96
Ash	%	3.89	4.24	–
Oxygen, by difference	%	5.05	5.50	5.74
Heating value:				
	MJ/kg	31.76	34.59	36.13
	kcal/kg	7586	8263	8629
	Btu/lb	13655	14873	15532

Hardgrove grindability index		59
Free swelling index (FSI)		8.0
Moisture (as rec'd)		
Inherent	%	1.16
Adherent	%	7.03

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1071	1371
Spherical	°C	1102	1402
Hemispherical	°C	1129	1404
Fluid	°C	1354	1416

Notes: Thermal Fines Product is from CBDC's Victoria Junction Coal Preparation Plant

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	8-05-84
Sampling location	Seaboard Power Station (NSPC)
Product name	23 Thermal Coal (Fines)
Screen opening ,mm	Minus 24 mesh
(Screen opening ,in)	
ERL number	3196-84

Ash analysis, per cent:

SiO_2	29.40
Al_2O_3	16.91
Fe_2O_3	43.89
Mn_3O_4	–
TiO_2	0.90
P_2O_5	0.27
CaO	1.75
MgO	0.96
SO_3	1.38
Na_2O	0.66
K_2O	1.18
SrO	0.01
BaO	0.13
Loss on fusion (LOF)	0.93

Volatile trace element analysis ug/g (ppm)

Hg	0.16
Cl	810
F	28.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	9-05-84
Sampling location	Mine (u/g) 5 West Wall
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3197-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	1.79		
Ash	%	3.26	3.32	
Volatile	%	35.71	36.37	37.62
Fixed carbon	%	59.23	60.31	62.38
Ultimate:				
Carbon	%	80.96	82.44	85.27
Hydrogen	%	5.24	5.34	5.52
Sulphur (Pyritic)	%	(0.67)	(0.68)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.58)	(0.59)	(0.61)
Total	%	1.25	1.27	–
Nitrogen	%	1.97	2.01	2.08
Ash	%	3.26	3.32	–
Oxygen, by difference	%	5.52	5.62	5.81
Heating value:				
	MJ/kg	34.40	35.03	36.23
	kcal/kg	8216	8366	8653
	Btu/lb	14789	15059	15576

Hardgrove grindability index		57
Free swelling index (FSI)		7.5
Moisture (as rec'd)		
Inherent	%	1.37
Adherent	%	0.42

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1054	1354
Spherical	°C	1068	1391
Hemispherical	°C	1079	1402
Fluid	°C	1327	1410

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	9-05-84
Sampling location	Mine (u/g) 5 West Wall
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3197-84

Ash analysis, per cent:

SiO_2	31.83
Al_2O_3	19.38
Fe_2O_3	37.97
Mn_3O_4	-
TiO_2	0.86
P_2O_5	0.20
CaO	1.97
MgO	1.12
SO_3	1.79
Na_2O	0.77
K_2O	1.18
SrO	0.01
BaO	-
Loss on fusion (LOF)	0.90

Volatile trace element analysis ug/g (ppm)

Hg	0.09
Cl	670
F	19.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	9-05-84
Sampling location	Mine (u/g)
Product name	Slack
Screen opening ,mm	Minus 51 ,sq
(Screen opening ,in)	Minus 2 ,sq
ERL number	3198-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	6.32		
Ash	%	25.22	26.92	
Volatile	%	27.26	29.10	39.82
Fixed carbon	%	41.20	43.98	60.18
Ultimate:				
Carbon	%	57.35	61.22	83.77
Hydrogen	%	3.85	4.11	5.62
Sulphur (Pyritic)	%	(1.13)	(1.20)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.27)	(0.28)	(0.39)
Total	%	1.40	1.49	–
Nitrogen	%	1.37	1.46	2.00
Ash	%	25.22	26.92	–
Oxygen, by difference	%	4.50	4.80	6.57
Heating value:				
	MJ/kg	24.09	25.71	35.18
	kcal/kg	5753	6141	8403
	Btu/lb	10355	11053	15125

Hardgrove grindability index		59
Free swelling index (FSI)		6.5
Moisture (as rec'd)		
Inherent	%	1.16
Adherent	%	5.16

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1216	1404
Spherical	°C	1332	1457
Hemispherical	°C	1416	1460
Fluid	°C	1482+	1482

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	9-05-84
Sampling location	Mine (u/g)
Product name	Slack
Screen opening ,mm	Minus 51 ,sq
(Screen opening ,in)	Minus 2 ,sq
ERL number	3198-84

Ash analysis, per cent:

SiO_2	53.78
Al_2O_3	24.60
Fe_2O_3	10.19
Mn_3O_4	-
TiO_2	0.96
P_2O_5	0.06
CaO	1.02
MgO	1.60
SO_3	1.23
Na_2O	0.70
K_2O	3.73
SrO	0.04
BaO	0.03
Loss on fusion (LOF)	0.80

Volatile trace element analysis ug/g (ppm)

Hg	0.12
Cl	780
F	140.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	10-05-84
Sampling location	Coal Preparation Plant Victoria Junction
Product name	Raw feed
Screen opening ,mm	Minus 38 ,sq
(Screen opening ,in)	Minus 1 1/2 ,sq
ERL number	3200-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	8.08		
Ash	%	21.45	23.34	
Volatile	%	27.34	29.74	38.79
Fixed carbon	%	43.13	46.92	61.21
Ultimate:				
Carbon	%	58.91	64.09	83.60
Hydrogen	%	3.95	4.30	5.61
Sulphur (Pyritic)	%	(1.45)	(1.58)	–
(Sulphate)	%	(0.04)	(0.04)	–
(Organic)	%	(0.28)	(0.30)	(0.40)
Total	%	1.77	1.93	–
Nitrogen	%	1.37	1.49	1.94
Ash	%	21.45	23.34	–
Oxygen, by difference	%	4.46	4.85	6.33
Heating value:				
	MJ/kg	24.44	26.58	34.68
	kcal/kg	5836	6349	8282
	Btu/lb	10505	11428	14908

Hardgrove grindability index		59
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	1.27
Adherent	%	6.81

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1182	1357
Spherical	°C	1252	1427
Hemispherical	°C	1399	1454
Fluid	°C	1432	1460

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	10-05-84
Sampling location	Coal Preparation Plant Victoria Junction
Product name	Raw feed
Screen opening ,mm	Minus 38 ,sq
(Screen opening ,in)	Minus 1 1/2 ,sq
ERL number	3200-84

Ash analysis, per cent:

SiO2	53.00
Al2O3	23.14
Fe2O3	13.59
Mn3O4	-
TiO2	0.98
P2O5	-
CaO	0.56
MgO	1.58
SO3	0.77
Na2O	0.64
K2O	3.53
SrO	0.02
BaO	0.08
Loss on fusion (LOF)	0.68

Volatile trace element analysis ug/g (ppm)

Hg	0.14
Cl	790
F	123.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	10-05-84
Sampling location	Coal Preparation Plant Victoria Junction
Product name	Thermal Coal
Screen opening ,mm	Minus 38 ,sq
(Screen opening ,in)	Minus 1 1/2 ,sq
ERL number	3201-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	5.40		
Ash	%	2.85	3.01	
Volatile	%	34.50	36.47	37.60
Fixed carbon	%	57.25	60.52	62.40
Ultimate:				
Carbon	%	77.92	82.36	84.92
Hydrogen	%	4.98	5.26	5.42
Sulphur (Pyritic)	%	(0.86)	(0.91)	-
(Sulphate)	%	(0.02)	(0.02)	-
(Organic)	%	(0.53)	(0.56)	(0.57)
Total	%	1.41	1.49	-
Nitrogen	%	1.84	1.95	2.01
Ash	%	2.85	3.01	-
Oxygen, by difference	%	5.61	5.93	6.11
Heating value:				
	MJ/kg	33.29	35.19	36.28
	kcal/kg	7951	8405	8666
	Btu/lb	14313	15129	15598

Hardgrove grindability index		60
Free swelling index (FSI)		8.0
Moisture (as rec'd)		
Inherent	%	1.25
Adherent	%	4.15

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1071	1382
Spherical	°C	1082	1410
Hemispherical	°C	1096	1416
Fluid	°C	1316	1438

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	10-05-84
Sampling location	Coal Preparation Plant Victoria Junction
Product name	Thermal Coal
Screen opening ,mm	Minus 38 ,sq
(Screen opening ,in)	Minus 1 1/2 ,sq
ERL number	3201-84

Ash analysis, per cent:

SiO_2	26.40
Al_2O_3	16.79
Fe_2O_3	49.51
Mn_3O_4	-
TiO_2	0.89
P_2O_5	0.28
CaO	1.24
MgO	0.79
SO_3	0.81
Na_2O	0.64
K_2O	0.86
SrO	0.01
BaO	-
Loss on fusion (LOF)	0.67

Volatile trace element analysis ug/g (ppm)

Hg	0.15
Cl	410
F	21.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	10-05-84
Sampling location	Coal Preparation Plant Victoria Junction
Product name	Coarse Product
Screen opening ,mm	38 x 24 mesh ,sq
(Screen opening ,in)	1 1/2 x 24 mesh ,sq
ERL number	3202-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	5.36		
Ash	%	2.73	2.88	
Volatile	%	35.87	37.90	39.03
Fixed carbon	%	56.05	59.22	60.97
Ultimate:				
Carbon	%	78.23	82.66	85.11
Hydrogen	%	5.14	5.43	5.59
Sulphur (Pyritic)	%	(0.94)	(0.99)	–
(Sulphate)	%	(0.02)	(0.02)	–
(Organic)	%	(0.58)	(0.62)	(0.64)
Total	%	1.54	1.63	–
Nitrogen	%	1.79	1.89	1.95
Ash	%	2.73	2.88	–
Oxygen, by difference	%	5.21	5.51	5.67
Heating value:				
	MJ/kg	33.13	35.01	36.04
	kcal/kg	7913	8361	8609
	Btu/lb	14243	15050	15496

Hardgrove grindability index		60
Free swelling index (FSI)		8.0
Moisture (as rec'd)		
Inherent	%	1.25
Adherent	%	4.11

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1096	1421
Spherical	°C	1107	1424
Hemispherical	°C	1132	1427
Fluid	°C	1304	1435

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	10-05-84
Sampling location	Coal Preparation Plant Victoria Junction
Product name	Coarse Product
Screen opening ,mm	38 x 24 mesh ,sq
(Screen opening ,in)	1 1/2 x 24 mesh ,sq
ERL number	3202-84

Ash analysis, per cent:

SiO2	22.36
Al2O3	14.64
Fe2O3	55.40
Mn3O4	–
TiO2	0.87
P2O5	0.25
CaO	1.22
MgO	0.68
SO3	0.77
Na2O	0.62
K2O	0.68
SrO	–
BaO	–
Loss on fusion (LOF)	0.62

Volatile trace element analysis ug/g (ppm)

Hg	0.13
Cl	460
F	15.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	10-05-84
Sampling location	Coal Preparation Plant Victoria Junction
Product name	Thermal Fines Product
Screen opening ,mm	Minus 24 mesh
(Screen opening ,in)	
ERL number	2332-85

Rank of coal		High-volatile A bituminous		
Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	15.15		
Ash	%	9.67	11.40	
Volatile	%	28.64	33.76	38.10
Fixed carbon	%	46.53	54.84	61.90
Ultimate:				
Carbon	%	63.76	75.15	84.82
Hydrogen	%	4.12	4.86	5.49
Sulphur (Pyritic)	%	(1.90)	(2.24)	-
(Sulphate)	%	(0.03)	(0.03)	-
(Organic)	%	(0.50)	(0.59)	(0.66)
Total	%	2.43	2.86	-
Nitrogen	%	1.44	1.70	1.92
Ash	%	9.67	11.40	-
Oxygen, by difference	%	3.42	4.03	4.55
Heating value:				
	MJ/kg	27.65	32.59	36.78
	kcal/kg	6604	7784	8785
	Btu/lb	11887	14010	15813

Hardgrove grindability index			
Free swelling index (FSI)		8.0	
Moisture (as rec'd)			
Inherent	%	1.13	
Adherent	%	14.02	
Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1074	1366
Spherical	°C	1107	1402
Hemispherical	°C	1279	1416
Fluid	°C	1421	1446

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Lingan Mine; Harbour Seam; Sydney Coalfield
Lingan, Cape Breton County, Nova Scotia

Sampling date	10-05-84
Sampling location	Coal Preparation Plant Victoria Junction
Product name	Thermal Fines Product
Screen opening ,mm	Minus 24 mesh
(Screen opening ,in)	
ERL number	2332-85

Ash analysis, per cent:

SiO_2	39.27
Al_2O_3	20.39
Fe_2O_3	31.77
Mn_3O_4	-
TiO_2	1.01
P_2O_5	0.14
CaO	1.21
MgO	0.81
SO_3	0.88
Na_2O	0.64
K_2O	1.62
SrO	0.02
BaO	-
Loss on fusion (LOF)	0.45

Volatile trace element analysis ug/g (ppm)

Hg	0.18
Cl	680
F	63.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
No. 26 Colliery; Harbour Seam; Sydney Coalfield
Glace Bay, Cape Breton County, Nova Scotia

Sampling date	7-06-84
Sampling location	Coal Preparation Plant Victoria Junc (stockpile)
Product name	Slack
Screen opening ,mm	Minus 51 ,sq
(Screen opening ,in)	Minus 2 ,sq
ERL number	3361-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	5.57		
Ash	%	19.33	20.47	
Volatile	%	27.15	28.75	36.15
Fixed carbon	%	47.95	50.78	63.85
Ultimate:				
Carbon	%	64.85	68.67	86.34
Hydrogen	%	4.10	4.34	5.46
Sulphur (Pyritic)	%	(0.50)	(0.53)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.34)	(0.36)	(0.46)
Total	%	0.84	0.89	–
Nitrogen	%	1.56	1.65	2.07
Ash	%	19.33	20.47	–
Oxygen, by difference	%	3.76	3.98	5.00
Heating value:				
	MJ/kg	26.52	28.09	35.31
	kcal/kg	6335	6708	8435
	Btu/lb	11402	12075	15182

Hardgrove grindability index		70
Free swelling index (FSI)		7.5
Moisture (as rec'd)		
Inherent	%	1.13
Adherent	%	4.44

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1129	1321
Spherical	°C	1177	1382
Hemispherical	°C	1282	1399
Fluid	°C	1341	1438

Notes: On April 5, 1984 No. 26 Colliery was closed due to a fire in the main deeps.

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
No. 26 Colliery; Harbour Seam; Sydney Coalfield
Glace Bay, Cape Breton County, Nova Scotia

Sampling date	7-06-84
Sampling location	Coal Preparation Plant Victoria Junc (stockpile)
Product name	Slack
Screen opening ,mm	Minus 51 ,sq
(Screen opening ,in)	Minus 2 ,sq
ERL number	3361-84

Ash analysis, per cent:

SiO_2	53.24
Al_2O_3	19.08
Fe_2O_3	16.26
Mn_3O_4	-
TiO_2	0.92
P_2O_5	0.08
CaO	1.09
MgO	1.28
SO_3	1.64
Na_2O	0.44
K_2O	2.81
SrO	0.02
BaO	0.11
Loss on fusion (LOF)	0.69

Volatile trace element analysis ug/g (ppm)

Hg	0.11
Cl	660
F	94.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Prince Mine; Hub Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	8-05-84
Sampling location	Mine (u/g) No. 4 Deep
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3194-84

Rank of coal .... High-volatile A bituminous

	As Rec'd	Dry	Dry Ash Free
Proximate analysis:			
Moisture .... %	8.67		
Ash .... %	6.60	7.23	
Volatile .... %	32.37	35.44	38.20
Fixed carbon .... %	52.36	57.33	61.80
Ultimate:			
Carbon .... %	69.00	75.55	81.44
Hydrogen .... %	4.41	4.83	5.21
Sulphur (Pyritic) .... %	(1.61)	(1.77)	–
(Sulphate) .... %	(0.05)	(0.05)	–
(Organic) .... %	(0.97)	(1.06)	(1.14)
Total .... %	2.63	2.88	–
Nitrogen .... %	1.47	1.61	1.74
Ash .... %	6.60	7.23	–
Oxygen, by difference ...... %	7.22	7.90	8.52
Heating value:			
MJ/kg	29.65	32.46	34.99
kcal/kg	7082	7754	8358
Btu/lb	12747	13957	15045

Hardgrove grindability index	60
Free swelling index (FSI)	7.0
Moisture (as rec'd)	
Inherent .... %	3.57
Adherent .... %	5.10

Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1057	1366
Spherical .... °C	1082	1393
Hemispherical .... °C	1107	1413
Fluid .... °C	1279	1416

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Prince Mine; Hub Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	8-05-84
Sampling location	Mine (u/g) No. 4 Deep
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3194-84

Ash analysis, per cent:

SiO2	38.44
Al2O3	16.45
Fe2O3	36.79
Mn3O4	–
TiO2	0.84
P2O5	0.16
CaO	1.57
MgO	0.74
SO3	1.16
Na2O	0.87
K2O	1.11
SrO	–
BaO	0.01
Loss on fusion (LOF)	0.91

Volatile trace element analysis ug/g (ppm)

Hg	0.15
Cl	3440
F	26.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Prince Mine; Hub Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	8-05-84
Sampling location	Mine (u/g)
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3195-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	7.81		
Ash	%	17.86	19.37	
Volatile	%	29.77	32.30	40.06
Fixed carbon	%	44.56	48.33	59.94
Ultimate:				
Carbon	%	59.10	64.11	79.51
Hydrogen	%	3.94	4.27	5.30
Sulphur (Pyritic)	%	(3.04)	(3.29)	–
(Sulphate)	%	(0.10)	(0.11)	–
(Organic)	%	(1.22)	(1.32)	(1.64)
Total	%	4.36	4.73	–
Nitrogen	%	1.30	1.41	1.75
Ash	%	17.86	19.37	–
Oxygen, by difference	%	5.63	6.11	7.58
Heating value:				
	MJ/kg	25.12	27.25	33.79
	kcal/kg	6000	6508	8071
	Btu/lb	10799	11714	14529

Hardgrove grindability index		57
Free swelling index (FSI)		6.0
Moisture (as rec'd)		
Inherent	%	2.40
Adherent	%	5.41

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1088	1382
Spherical	°C	1263	1413
Hemispherical	°C	1346	1416
Fluid	°C	1371	1418

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Prince Mine; Hub Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	8-05-84
Sampling location	Mine (u/g)
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3195-84

Ash analysis, per cent:

SiO_2	38.92
Al_2O_3	23.43
Fe_2O_3	26.50
Mn_3O_4	–
TiO_2	0.85
P_2O_5	0.40
CaO	1.69
MgO	0.85
SO_3	1.40
Na_2O	0.65
K_2O	1.89
SrO	–
BaO	0.10
Loss on fusion (LOF)	1.10

Volatile trace element analysis ug/g (ppm)

Hg	0.18
Cl	2770
F	79.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Prince Mine; Hub Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	3-05-84
Sampling location	Trenton Power Station (NSPC)
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3180-84

Rank of coal	High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	6.68		
Ash	%	20.18	21.62	
Volatile	%	28.93	31.00	39.56
Fixed carbon	%	44.21	47.38	60.44
Ultimate:				
Carbon	%	57.60	61.72	78.74
Hydrogen	%	3.85	4.13	5.27
Sulphur (Pyritic)	%	(3.64)	(3.90)	–
(Sulphate)	%	(0.18)	(0.20)	–
(Organic)	%	(1.14)	(1.22)	(1.56)
Total	%	4.96	5.32	–
Nitrogen	%	1.22	1.31	1.67
Ash	%	20.18	21.62	–
Oxygen, by difference	%	5.51	5.90	7.53
Heating value:				
	MJ/kg	24.82	26.59	33.93
	kcal/kg	5928	6352	8104
	Btu/lb	10670	11433	14586

Hardgrove grindability index		58
Free swelling index (FSI)		6.0
Moisture (as rec'd)		
Inherent	%	3.53
Adherent	%	3.15

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1079	1366
Spherical	°C	1196	1388
Hemispherical	°C	1291	1393
Fluid	°C	1304	1399

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Prince Mine; Hub Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	3-05-84
Sampling location	Trenton Power Station (NSPC)
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3180-84

Ash analysis, per cent:

SiO_2	41.23
Al_2O_3	20.24
Fe_2O_3	28.13
Mn_3O_4	-
TiO_2	0.79
P_2O_5	0.42
CaO	1.79
MgO	0.79
SO_3	1.34
Na_2O	0.60
K_2O	1.86
SrO	0.05
BaO	-
Loss on fusion (LOF)	0.30

Volatile trace element analysis ug/g (ppm)

Hg	0.16
Cl	2860
F	99.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Prince Mine; Hub Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	9-05-84
Sampling location	Lingan Power Station (NSPC)
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3199-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	9.90		
Ash	%	14.70	16.32	
Volatile	%	30.85	34.24	40.92
Fixed carbon	%	44.54	49.44	59.08
Ultimate:				
Carbon	%	59.23	65.74	78.56
Hydrogen	%	4.00	4.44	5.31
Sulphur (Pyritic)	%	(3.59)	(3.98)	-
(Sulphate)	%	(0.16)	(0.18)	-
(Organic)	%	(1.03)	(1.14)	(1.36)
Total	%	4.78	5.30	-
Nitrogen	%	1.32	1.46	1.74
Ash	%	14.70	16.32	-
Oxygen, by difference	%	6.07	6.74	8.05
Heating value:				
	MJ/kg	25.64	28.46	34.01
	kcal/kg	6124	6797	8123
	Btu/lb	11023	12234	14621

Hardgrove grindability index		55
Free swelling index (FSI)		5.0
Moisture (as rec'd)		
Inherent	%	3.38
Adherent	%	6.52

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1060	1377
Spherical	°C	1093	1404
Hemispherical	°C	1121	1407
Fluid	°C	1313	1413

Notes:

CAPE BRETON DEVELOPMENT CORPORATION (CBDC)
Prince Mine; Hub Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	9-05-84
Sampling location	Lingan Power Station (NSPC)
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3199-84

Ash analysis, per cent:

SiO_2	34.78
Al_2O_3	18.75
Fe_2O_3	36.94
Mn_3O_4	-
TiO_2	0.69
P_2O_5	0.20
CaO	1.22
MgO	0.84
SO_3	1.33
Na_2O	0.42
K_2O	2.17
SrO	0.01
BaO	-
Loss on fusion (LOF)	1.03

Volatile trace element analysis ug/g (ppm)

Hg	0.18
Cl	1670
F	64.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

THOMAS BROGAN AND SONS CONSTRUCTION LTD.
Brogans Mine; Upper Bonar (Lloyd Cove) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	25-06-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3362-84

Rank of coal	High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	11.15		
Ash	%	6.02	6.77	
Volatile	%	32.31	36.36	39.00
Fixed carbon	%	50.53	56.87	61.00
Ultimate:				
Carbon	%	65.33	73.52	78.86
Hydrogen	%	3.53	3.97	4.26
Sulphur (Pyritic)	%	(2.95)	(3.32)	-
(Sulphate)	%	(0.25)	(0.28)	-
(Organic)	%	(1.00)	(1.13)	(1.21)
Total	%	4.20	4.73	-
Nitrogen	%	1.93	2.17	2.33
Ash	%	6.02	6.77	-
Oxygen, by difference	%	7.85	8.84	9.48
Heating value:				
	MJ/kg	28.11	31.63	33.93
	kcal/kg	6714	7556	8105
	Btu/lb	12085	13601	14588

Hardgrove grindability index		54
Free swelling index (FSI)		5.0
Moisture (as rec'd)		
Inherent	%	6.64
Adherent	%	4.51

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1096	1449
Spherical	°C	1107	1460
Hemispherical	°C	1110	1466
Fluid	°C	1121	1468

Notes:

THOMAS BROGAN AND SONS CONSTRUCTION LTD.
Brogans Mine; Upper Bonar (Lloyd Cove) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	25-06-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3362-84

Ash analysis, per cent:

SiO2	17.09
Al2O3	8.06
Fe2O3	68.67
Mn3O4	–
TiO2	0.27
P2O5	–
CaO	0.94
MgO	0.60
SO3	1.37
Na2O	0.13
K2O	0.81
SrO	–
BaO	–
Loss on fusion (LOF)	0.66

Volatile trace element analysis ug/g (ppm)

Hg	0.10
Cl	190
F	23.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

THOMAS BROGAN AND SONS CONSTRUCTION LTD.
Brogans Mine; Lower Bonar (Lloyd Cove) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3187-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	9.33		
Ash	%	6.92	7.63	
Volatile	%	32.34	35.67	38.61
Fixed carbon	%	51.42	56.70	61.39
Ultimate:				
Carbon	%	66.85	73.73	79.82
Hydrogen	%	4.37	4.82	5.22
Sulphur (Pyritic)	%	(2.43)	(2.68)	-
(Sulphate)	%	(0.11)	(0.13)	-
(Organic)	%	(1.68)	(1.85)	(2.00)
Total	%	4.23	4.66	-
Nitrogen	%	1.37	1.51	1.63
Ash	%	6.92	7.63	-
Oxygen, by difference	%	6.94	7.65	8.28
Heating value:				
	MJ/kg	28.69	31.65	34.26
	kcal/kg	6854	7559	8183
	Btu/lb	12337	13605	14729

Hardgrove grindability index		55
Free swelling index (FSI)		6.5
Moisture (as rec'd)		
Inherent	%	4.00
Adherent	%	5.33

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1049	1404
Spherical	°C	1057	1413
Hemispherical	°C	1107	1416
Fluid	°C	1185	1418

Notes:

THOMAS BROGAN AND SONS CONSTRUCTION LTD.
Brogans Mine; Lower Bonar (Lloyd Cove) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3187-84

Ash analysis, per cent:

SiO2	27.86
Al2O3	11.94
Fe2O3	51.18
Mn3O4	–
TiO2	0.58
P2O5	1.04
CaO	2.55
MgO	0.71
SO3	1.23
Na2O	0.36
K2O	1.12
SrO	–
BaO	0.04
Loss on fusion (LOF)	0.13

Volatile trace element analysis ug/g (ppm)

Hg	0.14
Cl	1580
F	76.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

THOMAS BROGAN AND SONS CONSTRUCTION LTD.
Brogans Mine; Lower Bonar (Lloyd Cove) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Mine (surface)
Product name	Nut
Screen opening ,mm	51 x 6.4 ,sq
(Screen opening ,in)	2 x 1/4 ,sq
ERL number	3188-84

Rank of coal .... High-volatile A bituminous

		As Rec d	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	9.65		
Ash	%	10.67	11.81	
Volatile	%	31.08	34.40	39.00
Fixed carbon	%	48.60	53.79	61.00
Ultimate:				
Carbon	%	62.51	69.19	78.46
Hydrogen	%	4.12	4.56	5.17
Sulphur (Pyritic)	%	(3.02)	(3.35)	-
(Sulphate)	%	(0.19)	(0.21)	-
(Organic)	%	(1.86)	(2.06)	(2.34)
Total	%	5.08	5.62	-
Nitrogen	%	1.24	1.37	1.55
Ash	%	10.67	11.81	-
Oxygen, by difference	%	6.73	7.45	8.45
Heating value:				
	MJ/kg	27.06	29.95	33.96
	kcal/kg	6462	7152	8110
	Btu/lb	11632	12874	14599

Hardgrove grindability index		56
Free swelling index (FSI)		6.0
Moisture (as rec'd)		
Inherent	%	4.17
Adherent	%	5.48

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1060	1377
Spherical	°C	1071	1404
Hemispherical	°C	1085	1407
Fluid	°C	1207	1416

Notes:

THOMAS BROGAN AND SONS CONSTRUCTION LTD.
Brogans Mine; Lower Bonar (Lloyd Cove) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Mine (surface)
Product name	Nut
Screen opening ,mm	51 x 6.4 ,sq
(Screen opening ,in)	2 x 1/4 ,sq
ERL number	3188-84

Ash analysis, per cent:

SiO_2	34.43
Al_2O_3	13.19
Fe_2O_3	42.67
Mn_3O_4	-
TiO_2	0.61
P_2O_5	0.76
CaO	1.61
MgO	0.99
SO_3	1.06
Na_2O	0.34
K_2O	1.79
SrO	-
BaO	0.09
Loss on fusion (LOF)	0.79

Volatile trace element analysis ug/g (ppm)

Hg	0.13
Cl	270
F	80.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

THOMAS BROGAN AND SONS CONSTRUCTION LTD.
Brogans Mine; Lower Bonar (Lloyd Cove) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Mine (surface)
Product name	Fines
Screen opening ,mm	Minus 6.4 ,sq
(Screen opening ,in)	Minus 1/4 ,sq
ERL number	3189-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	13.57		
Ash	%	15.93	18.43	
Volatile	%	27.26	31.54	38.67
Fixed carbon	%	43.24	50.03	61.33
Ultimate:				
Carbon	%	54.87	63.48	77.82
Hydrogen	%	3.57	4.13	5.06
Sulphur (Pyritic)	%	(3.26)	(3.77)	-
(Sulphate)	%	(0.23)	(0.27)	-
(Organic)	%	(1.78)	(2.06)	(2.53)
Total	%	5.27	6.10	-
Nitrogen	%	1.05	1.21	1.48
Ash	%	15.93	18.43	-
Oxygen, by difference	%	5.75	6.65	8.15
Heating value:				
	MJ/kg	23.77	27.50	33.71
	kcal/kg	5677	6568	8052
	Btu/lb	10218	11822	14493

Hardgrove grindability index		61
Free swelling index (FSI)		5.0
Moisture (as rec'd)		
Inherent	%	3.13
Adherent	%	10.44

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1054	1338
Spherical	°C	1096	1385
Hemispherical	°C	1210	1399
Fluid	°C	1224	1410

Notes:

THOMAS BROGAN AND SONS CONSTRUCTION LTD.
Brogans Mine; Lower Bonar (Lloyd Cove) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Mine (surface)
Product name	Fines
Screen opening ,mm	Minus 6.4 ,sq
(Screen opening ,in)	Minus 1/4 ,sq
ERL number	3189-84

Ash analysis, per cent:

SiO_2	42.48
Al_2O_3	15.22
Fe_2O_3	32.97
Mn_3O_4	–
TiO_2	0.65
P_2O_5	0.53
CaO	1.11
MgO	0.89
SO_3	0.58
Na_2O	0.39
K_2O	2.41
SrO	–
BaO	0.11
Loss on fusion (LOF)	0.39

Volatile trace element analysis ug/g (ppm)

Hg	0.11
Cl	220
F	112.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

SELMINCO INC.
Coal Reclamation Project; Princess Dump; Sydney Coalfield
Sydney Mines, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Stockpile
Product name	Slack
Screen opening ,mm	38 x 28 mesh ,sq
(Screen opening ,in)	1 1/2 x 28 mesh ,sq
ERL number	3192-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	6.02		
Ash	%	5.73	6.10	
Volatile	%	34.14	36.32	38.68
Fixed carbon	%	54.11	57.58	61.32
Ultimate:				
Carbon	%	73.93	78.67	83.78
Hydrogen	%	4.95	5.27	5.61
Sulphur (Pyritic)	%	(1.08)	(1.15)	–
(Sulphate)	%	(0.04)	(0.04)	–
(Organic)	%	(0.77)	(0.82)	(0.88)
Total	%	1.89	2.01	–
Nitrogen	%	1.73	1.84	1.96
Ash	%	5.73	6.10	–
Oxygen, by difference	%	5.74	6.11	6.51
Heating value:				
	MJ/kg	31.45	33.47	35.64
	kcal/kg	7512	7993	8513
	Btu/lb	13522	14388	15323

Hardgrove grindability index	57
Free swelling index (FSI)	8.0

Moisture (as rec'd)		
Inherent	%	1.50
Adherent	%	4.52

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1057	1371
Spherical	°C	1152	1399
Hemispherical	°C	1268	1404
Fluid	°C	1318	1413

Notes:

SELMINCO INC.
Coal Reclamation Project; Princess Dump; Sydney Coalfield
Sydney Mines, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Stockpile
Product name	Slack
Screen opening ,mm	38 x 28 mesh ,sq
(Screen opening ,in)	1 1/2 x 28 mesh ,sq
ERL number	3192-84

Ash analysis, per cent:

SiO_2	37.06
Al_2O_3	19.02
Fe_2O_3	34.74
Mn_3O_4	-
TiO_2	1.14
P_2O_5	0.41
CaO	1.19
MgO	0.83
SO_3	0.97
Na_2O	0.45
K_2O	1.41
SrO	0.02
BaO	0.17
Loss on fusion (LOF)	1.25

Volatile trace element analysis ug/g (ppm)

Hg	0.23
Cl	1270
F	33.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

SELMINCO INC.
Coal Reclamation Project; Summit Dump; Sydney Coalfield
New Waterford, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Stockpile
Product name	Slack
Screen opening ,mm	38 x 28 mesh ,sq
(Screen opening ,in)	1 1/2 x 28 mesh ,sq
ERL number	3193-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	7.40		
Ash	%	4.96	5.36	
Volatile	%	31.93	34.48	36.44
Fixed carbon	%	55.71	60.16	63.56
Ultimate:				
Carbon	%	73.27	79.12	83.60
Hydrogen	%	5.07	5.48	5.79
Sulphur (Pyritic)	%	(0.59)	(0.64)	-
(Sulphate)	%	(0.05)	(0.05)	-
(Organic)	%	(0.82)	(0.89)	(0.94)
Total	%	1.46	1.58	-
Nitrogen	%	1.64	1.77	1.87
Ash	%	4.96	5.36	-
Oxygen, by difference	%	6.20	6.69	7.07
Heating value:				
	MJ/kg	31.06	33.54	35.44
	kcal/kg	7418	8010	8464
	Btu/lb	13352	14418	15235

Hardgrove grindability index		63
Free swelling index (FSI)		7.5
Moisture (as rec'd)		
Inherent	%	1.72
Adherent	%	5.68

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1066	1379
Spherical	°C	1141	1407
Hemispherical	°C	1304	1410
Fluid	°C	1321	1418

Notes:

SELMINCO INC.
Coal Reclamation Project; Summit Dump; Sydney Coalfield
New Waterford, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Stockpile
Product name	Slack
Screen opening ,mm	38 x 28 mesh ,sq
(Screen opening ,in)	1 1/2 x 28 mesh ,sq
ERL number	3193-84

Ash analysis, per cent:

SiO2	43.39
Al2O3	20.52
Fe2O3	25.48
Mn3O4	-
TiO2	1.12
P2O5	0.42
CaO	1.55
MgO	0.66
SO3	1.11
Na2O	0.54
K2O	2.01
SrO	0.05
BaO	0.06
Loss on fusion (LOF)	1.04

Volatile trace element analysis ug/g (ppm)

Hg	0.15
Cl	3010
F	51.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

PIONEER COAL CO. LTD.
Novaco Mine; Upper Sydney Main (Harbour) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3190-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	6.47		
Ash	%	8.67	9.27	
Volatile	%	34.46	36.84	40.61
Fixed carbon	%	50.40	53.89	59.39
Ultimate:				
Carbon	%	66.06	70.63	77.85
Hydrogen	%	4.44	4.75	5.24
Sulphur (Pyritic)	%	(4.43)	(4.74)	–
(Sulphate)	%	(0.17)	(0.18)	–
(Organic)	%	(1.14)	(1.22)	(1.35)
Total	%	5.74	6.14	–
Nitrogen	%	1.49	1.59	1.75
Ash	%	8.67	9.27	–
Oxygen, by difference	%	7.13	7.62	8.40
Heating value:				
	MJ/kg	29.23	31.26	34.45
	kcal/kg	6983	7466	8228
	Btu/lb	12569	13438	14811

Hardgrove grindability index		56
Free swelling index (FSI)		5.5
Moisture (as rec'd)		
Inherent	%	4.06
Adherent	%	2.41

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1135	1457
Spherical	°C	1157	1466
Hemispherical	°C	1196	1468
Fluid	°C	1235	1474

Notes: Novaco Mine is owned by Novaco (a wholly owned Provincial Crown Corp.) and operated by Pioneer Coal Co. Ltd.

PIONEER COAL CO. LTD.
Novaco Mine; Upper Sydney Main (Harbour) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3190-84

Ash analysis, per cent:

SiO_2	13.13
Al_2O_3	9.03
Fe_2O_3	74.35
Mn_3O_4	-
TiO_2	0.25
P_2O_5	0.16
CaO	1.20
MgO	0.34
SO_3	0.82
Na_2O	0.33
K_2O	0.40
SrO	-
BaO	0.06
Loss on fusion (LOF)	0.75

Volatile trace element analysis ug/g (ppm)

Hg	0.28
Cl	2610
F	30.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

PIONEER COAL CO. LTD.

Novaco Mine; Upper Sydney Main (Harbour) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Mine (surface) Sampled from stockpile
Product name	Slack
Screen opening ,mm	Minus 51 ,rd
(Screen opening ,in)	Minus 2 ,rd
ERL number	3191-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	8.38		
Ash	%	12.50	13.64	
Volatile	%	32.88	35.89	41.56
Fixed carbon	%	46.24	50.47	58.44
Ultimate:				
Carbon	%	61.44	67.06	77.65
Hydrogen	%	4.20	4.58	5.30
Sulphur (Pyritic)	%	(4.34)	(4.74)	-
(Sulphate)	%	(0.16)	(0.18)	-
(Organic)	%	(1.09)	(1.19)	(1.37)
Total	%	5.59	6.10	-
Nitrogen	%	1.43	1.56	1.81
Ash	%	12.50	13.64	-
Oxygen, by difference	%	6.47	7.06	8.18
Heating value:				
	MJ/kg	27.14	29.63	34.30
	kcal/kg	6483	7076	8193
	Btu/lb	11669	12737	14748

Hardgrove grindability index		53
Free swelling index (FSI)		5.0
Moisture (as rec'd)		
Inherent	%	3.75
Adherent	%	4.63

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1099	1421
Spherical	°C	1116	1435
Hemispherical	°C	1132	1438
Fluid	°C	1282	1449

Notes: Novaco Mine is owned by Novaco (a wholly owned Provincial Crown Corp.) and operated by Pioneer Coal Co. Ltd.

PIONEER COAL CO. LTD.
Novaco Mine; Upper Sydney Main (Harbour) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	7-05-84
Sampling location	Mine (surface) Sampled from stockpile
Product name	Slack
Screen opening ,mm	Minus 51 ,rd
(Screen opening ,in)	Minus 2 ,rd
ERL number	3191-84

Ash analysis, per cent:

SiO2	25.90
Al2O3	15.70
Fe2O3	52.46
Mn3O4	—
TiO2	0.49
P2O5	0.15
CaO	0.87
MgO	0.71
SO3	0.58
Na2O	0.31
K2O	1.73
SrO	—
BaO	0.05
Loss on fusion (LOF)	0.56

Volatile trace element analysis ug/g (ppm)

Hg	0.29
Cl	1810
F	48.
Br	—
As	—
Se	—

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

PIONEER COAL CO. LTD.
Novaco Mine; Lower Sydney Main (Harbour) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	5-06-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3360-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	7.99		
Ash	%	9.80	10.65	
Volatile	%	32.86	35.71	39.97
Fixed carbon	%	49.35	53.64	60.03
Ultimate:				
Carbon	%	67.00	72.82	81.50
Hydrogen	%	4.53	4.92	5.51
Sulphur (Pyritic)	%	(1.97)	(2.14)	–
(Sulphate)	%	(0.09)	(0.09)	–
(Organic)	%	(0.87)	(0.94)	(1.06)
Total	%	2.92	3.17	–
Nitrogen	%	1.54	1.67	1.87
Ash	%	9.80	10.65	–
Oxygen, by difference	%	6.23	6.77	7.58
Heating value:				
	MJ/kg	27.94	30.36	33.98
	kcal/kg	6673	7252	8116
	Btu/lb	12011	13053	14609

Hardgrove grindability index		50
Free swelling index (FSI)		5.0
Moisture (as rec'd)		
Inherent	%	4.38
Adherent	%	3.61

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1068	1385
Spherical	°C	1177	1402
Hemispherical	°C	1338	1404
Fluid	°C	1368	1421

Notes: Novaco Mine is owned by Novaco (a wholly owned Provincial Crown Corp.) and operated by Pioneer Coal Co. Ltd.

PIONEER COAL CO. LTD.

Novaco Mine; Lower Sydney Main (Harbour) Seam; Sydney Coalfield
Point Aconi, Cape Breton County, Nova Scotia

Sampling date	5-06-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3360-84

Ash analysis, per cent:

SiO2	37.27
Al2O3	22.08
Fe2O3	30.32
Mn3O4	-
TiO2	0.79
P2O5	-
CaO	1.06
MgO	1.23
SO3	1.43
Na2O	0.43
K2O	2.45
SrO	0.01
BaO	-
Loss on fusion (LOF)	0.86

Volatile trace element analysis ug/g (ppm)

Hg	0.16
Cl	1850
F	49.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

COAL ANALYSES – NEW BRUNSWICK

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	5-04-84
Sampling location	Dragline 9W
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2799-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	2.92		
Ash	%	24.31	25.04	
Volatile	%	29.05	29.92	39.92
Fixed carbon	%	43.72	45.04	60.08
Ultimate:				
Carbon	%	58.14	59.89	79.90
Hydrogen	%	3.68	3.79	5.06
Sulphur (Pyritic)	%	(7.27)	(7.49)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(1.17)	(1.21)	(1.61)
Total	%	8.45	8.70	–
Nitrogen	%	0.81	0.83	1.11
Ash	%	24.31	25.04	–
Oxygen, by difference	%	1.70	1.75	2.33
Heating value:				
	MJ/kg	25.31	26.08	34.79
	kcal/kg	6046	6228	8309
	Btu/lb	10883	11211	14956

Hardgrove grindability index		58
Free swelling index (FSI)		6.5
Moisture (as rec'd)		
Inherent	%	0.68
Adherent	%	2.24

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1027	1332
Spherical	°C	1029	1382
Hemispherical	°C	1071	1393
Fluid	°C	1127	1399

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	5-04-84
Sampling location	Dragline 9W
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2799-84

Ash analysis, per cent:

SiO2	36.89
Al2O3	11.53
Fe2O3	39.43
Mn3O4	–
TiO2	0.64
P2O5	1.37
CaO	3.18
MgO	–
SO3	2.44
Na2O	0.19
K2O	1.29
SrO	–
BaO	0.12
Loss on fusion (LOF)	0.49

Volatile trace element analysis ug/g (ppm)

Hg	0.92
Cl	230
F	239.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Dragline 500
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2800-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	0.83		
Ash	%	15.16	15.29	
Volatile	%	32.69	32.96	38.91
Fixed carbon	%	51.32	51.75	61.09
Ultimate:				
Carbon	%	68.17	68.74	81.15
Hydrogen	%	4.24	4.28	5.05
Sulphur (Pyritic)	%	(8.99)	(9.06)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.91)	(0.91)	(1.08)
Total	%	9.89	9.97	–
Nitrogen	%	0.81	0.82	0.97
Ash	%	15.16	15.29	–
Oxygen, by difference	%	0.89	0.90	1.06
Heating value:				
	MJ/kg	29.83	30.08	35.50
	kcal/kg	7124	7183	8480
	Btu/lb	12823	12930	15264

Hardgrove grindability index		63
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	0.45
Adherent	%	0.38

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1082	1441
Spherical	°C	1091	1441
Hemispherical	°C	1096	1442
Fluid	°C	1141	1442

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Dragline 500
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2800-84

Ash analysis, per cent:

SiO2	15.60
Al2O3	6.00
Fe2O3	72.09
Mn3O4	-
TiO2	0.29
P2O5	0.59
CaO	1.51
MgO	-
SO3	1.42
Na2O	0.05
K2O	0.42
SrO	-
BaO	0.04
Loss on fusion (LOF)	0.80

Volatile trace element analysis ug/g (ppm)

Hg	0.70
Cl	210
F	61.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba
Sr
V
Mn
Cr

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Grand Lake Power Station (NBEPC) Dragline 500
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2801-84

Rank of coal	High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	2.21		
Ash	%	24.67	25.23	
Volatile	%	29.07	29.73	39.76
Fixed carbon	%	44.04	45.04	60.24
Ultimate:				
Carbon	%	57.79	59.10	79.04
Hydrogen	%	3.64	3.72	4.98
Sulphur (Pyritic)	%	(9.72)	(9.94)	–
(Sulphate)	%	(0.02)	(0.02)	–
(Organic)	%	(0.68)	(0.69)	(0.93)
Total	%	10.41	10.65	–
Nitrogen	%	0.59	0.60	0.80
Ash	%	24.67	25.23	–
Oxygen, by difference	%	0.68	0.70	0.94
Heating value:				
	MJ/kg	25.39	25.96	34.72
	kcal/kg	6063	6201	8293
	Btu/lb	10914	11161	14927

Hardgrove grindability index		63
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	0.48
Adherent	%	1.73

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1082	1416
Spherical	°C	1093	1418
Hemispherical	°C	1152	1421
Fluid	°C	1210	1427

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Grand Lake Power Station (NBEPC) Dragline 500
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2801-84

Ash analysis, per cent:

SiO2	29.70
Al2O3	11.59
Fe2O3	50.09
Mn3O4	–
TiO2	0.54
P2O5	0.77
CaO	1.61
MgO	1.04
SO3	1.27
Na2O	0.13
K2O	1.78
SrO	–
BaO	0.16
Loss on fusion (LOF)	0.36

Volatile trace element analysis ug/g (ppm)

Hg	0.89
Cl	210
F	156.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	5-04-84
Sampling location	Dragline 7200
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2802-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	3.64		
Ash	%	20.03	20.79	
Volatile	%	29.30	30.40	38.38
Fixed carbon	%	47.03	48.81	61.62
Ultimate:				
Carbon	%	60.85	63.15	79.72
Hydrogen	%	3.74	3.88	4.90
Sulphur (Pyritic)	%	(8.57)	(8.90)	-
(Sulphate)	%	(0.01)	(0.01)	-
(Organic)	%	(1.31)	(1.36)	(1.72)
Total	%	9.90	10.27	-
Nitrogen	%	0.67	0.70	0.88
Ash	%	20.03	20.79	-
Oxygen, by difference	%	1.17	1.21	1.53
Heating value:				
	MJ/kg	26.51	27.52	34.74
	kcal/kg	6333	6572	8297
	Btu/lb	11399	11830	14935

Hardgrove grindability index		61
Free swelling index (FSI)		6.5
Moisture (as rec'd)		
Inherent	%	0.64
Adherent	%	3.00

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1057	1404
Spherical	°C	1074	1416
Hemispherical	°C	1077	1418
Fluid	°C	1185	1438

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	5-04-84
Sampling location	Dragline 7200
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2802-84

Ash analysis, per cent:

SiO2	24.72
Al2O3	9.20
Fe2O3	56.07
Mn3O4	-
TiO2	0.47
P2O5	1.10
CaO	2.79
MgO	-
SO3	2.76
Na2O	0.15
K2O	0.78
SrO	-
BaO	0.04
Loss on fusion (LOF)	0.52

Volatile trace element analysis ug/g (ppm)

Hg	0.59
Cl	270
F	175.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Grand Lake Power Station (NBEPC) Dragline 7200
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2803-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	2.70		
Ash	%	23.35	24.00	
Volatile	%	29.17	29.98	39.45
Fixed carbon	%	44.78	46.02	60.55
Ultimate:				
Carbon	%	58.37	59.99	78.93
Hydrogen	%	3.60	3.70	4.87
Sulphur (Pyritic)	%	(9.27)	(9.52)	-
(Sulphate)	%	(0.02)	(0.02)	-
(Organic)	%	(1.49)	(1.53)	(2.01)
Total	%	10.77	11.07	-
Nitrogen	%	0.65	0.67	0.88
Ash	%	23.35	24.00	-
Oxygen, by difference	%	0.55	0.57	0.75
Heating value:				
	MJ/kg	25.54	26.25	34.54
	kcal/kg	6101	6270	8250
	Btu/lb	10982	11286	14850

Hardgrove grindability index		60
Free swelling index (FSI)		6.5
Moisture (as rec'd)		
Inherent	%	0.64
Adherent	%	2.06

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1060	1388
Spherical	°C	1068	1404
Hemispherical	°C	1077	1407
Fluid	°C	1229	1413

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Grand Lake Power Station (NBEPC) Dragline 7200
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2803-84

Ash analysis, per cent:

SiO_2	28.31
Al_2O_3	9.71
Fe_2O_3	53.21
Mn_3O_4	–
TiO_2	0.52
P_2O_5	0.68
CaO	1.93
MgO	0.80
SO_3	2.03
Na_2O	0.18
K_2O	0.91
SrO	–
BaO	0.04
Loss on fusion (LOF)	0.43

Volatile trace element analysis ug/g (ppm)

Hg	0.56
Cl	270
F	135.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Dragline 8200
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2804-84

Rank of coal	High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.59		
Ash	%	14.78	15.02	
Volatile	%	32.03	32.54	38.30
Fixed carbon	%	51.60	52.44	61.70
Ultimate:				
Carbon	%	69.34	70.46	82.91
Hydrogen	%	4.21	4.28	5.04
Sulphur (Pyritic)	%	(4.32)	(4.39)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(1.42)	(1.44)	(1.69)
Total	%	5.75	5.84	–
Nitrogen	%	0.87	0.88	1.04
Ash	%	14.78	15.02	–
Oxygen, by difference	%	3.46	3.52	4.14
Heating value:				
	MJ/kg	29.56	30.04	35.35
	kcal/kg	7061	7175	8443
	Btu/lb	12709	12915	15198

Hardgrove grindability index		60
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	0.66
Adherent	%	0.93

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1016	1293
Spherical	°C	1018	1371
Hemispherical	°C	1068	1382
Fluid	°C	1113	1393

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Dragline 8200
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2804-84

Ash analysis, per cent:

SiO2	35.07
Al2O3	10.80
Fe2O3	37.61
Mn3O4	-
TiO2	0.61
P2O5	2.19
CaO	5.44
MgO	-
SO3	3.95
Na2O	0.23
K2O	0.79
SrO	-
BaO	0.10
Loss on fusion (LOF)	0.91

Volatile trace element analysis ug/g (ppm)

Hg	0.29
Cl	260
F	213.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Grand Lake Power Station (NBEPC) Dragline 8200
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2805-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	2.21		
Ash	%	18.19	18.60	
Volatile	%	30.79	31.48	38.68
Fixed carbon	%	48.81	49.92	61.32
Ultimate:				
Carbon	%	64.93	66.40	81.57
Hydrogen	%	4.02	4.11	5.05
Sulphur (Pyritic)	%	(5.66)	(5.79)	–
(Sulphate)	%	(0.02)	(0.02)	–
(Organic)	%	(1.19)	(1.22)	(1.50)
Total	%	6.87	7.03	–
Nitrogen	%	0.78	0.80	0.98
Ash	%	18.19	18.60	–
Oxygen, by difference	%	2.99	3.06	3.76
Heating value:				
	MJ/kg	27.93	28.56	35.08
	kcal/kg	6670	6821	8379
	Btu/lb	12006	12277	15082

Hardgrove grindability index		60
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	0.64
Adherent	%	1.57

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1032	1329
Spherical	°C	1038	1393
Hemispherical	°C	1043	1399
Fluid	°C	1135	1410

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Grand Lake Power Station (NBEPC) Dragline 8200
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2805-84

Ash analysis, per cent:

SiO2	35.61
Al2O3	11.65
Fe2O3	39.82
Mn3O4	–
TiO2	0.59
P2O5	1.23
CaO	3.54
MgO	–
SO3	3.23
Na2O	0.22
K2O	1.30
SrO	–
BaO	0.20
Loss on fusion (LOF)	0.34

Volatile trace element analysis ug/g (ppm)

Hg	0.43
Cl	240
F	149.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	2-05-84
Sampling location	Dragline 7400
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3173-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	4.91		
Ash	%	9.73	10.23	
Volatile	%	33.54	35.27	39.29
Fixed carbon	%	51.82	54.50	60.71
Ultimate:				
Carbon	%	72.59	76.34	85.04
Hydrogen	%	4.77	5.02	5.59
Sulphur (Pyritic)	%	(3.45)	(3.62)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(1.12)	(1.18)	(1.32)
Total	%	4.58	4.82	–
Nitrogen	%	1.02	1.07	1.19
Ash	%	9.73	10.23	–
Oxygen, by difference	%	2.40	2.52	2.81
Heating value:				
	MJ/kg	31.31	32.92	36.67
	kcal/kg	7477	7863	8760
	Btu/lb	13459	14154	15767

Hardgrove grindability index		63
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	0.92
Adherent	%	3.99

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1088	1432
Spherical	°C	1102	1435
Hemispherical	°C	1152	1438
Fluid	°C	1221	1446

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	2-05-84
Sampling location	Dragline 7400
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3173-84

Ash analysis, per cent:

SiO_2	29.74
Al_2O_3	11.96
Fe_2O_3	49.09
Mn_3O_4	-
TiO_2	0.50
P_2O_5	0.24
CaO	1.34
MgO	0.83
SO_3	0.81
Na_2O	0.14
K_2O	2.64
SrO	-
BaO	-
Loss on fusion (LOF)	0.63

Volatile trace element analysis ug/g (ppm)

Hg	0.23
Cl	150
F	80.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	2-05-84
Sampling location	Grand Lake Power Station (NBEPC) Dragline 7400
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3174-84

Rank of coal		High-volatile A bituminous		
Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	6.94		
Ash	%	13.36	14.36	
Volatile	%	31.25	33.58	39.21
Fixed carbon	%	48.45	52.06	60.79
Ultimate:				
Carbon	%	67.65	72.69	84.88
Hydrogen	%	4.41	4.74	5.53
Sulphur (Pyritic)	%	(3.37)	(3.62)	-
(Sulphate)	%	(0.01)	(0.01)	-
(Organic)	%	(0.99)	(1.06)	(1.24)
Total	%	4.36	4.69	-
Nitrogen	%	1.01	1.09	1.27
Ash	%	13.36	14.36	-
Oxygen, by difference	%	2.26	2.43	2.84
Heating value:				
	MJ/kg	28.99	31.15	36.38
	kcal/kg	6925	7441	8689
	Btu/lb	12465	13394	15640

Hardgrove grindability index		62	
Free swelling index (FSI)		6.5	
Moisture (as rec'd)			
Inherent	%	0.99	
Adherent	%	5.95	
Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1074	1343
Spherical	°C	1143	1404
Hemispherical	°C	1179	1416
Fluid	°C	1182	1424

Notes:

N.B. COAL LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	2-05-84
Sampling location	Grand Lake Power Station (NBEPC) Dragline 7400
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3174-84

Ash analysis, per cent:

SiO2	43.86
Al2O3	13.18
Fe2O3	34.64
Mn3O4	–
TiO2	0.46
P2O5	0.13
CaO	0.96
MgO	0.95
SO3	0.71
Na2O	0.21
K2O	3.01
SrO	–
BaO	–
Loss on fusion (LOF)	0.60

Volatile trace element analysis ug/g (ppm)

Hg	0.16
Cl	50
F	98.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

KNOX CONSTRUCTION LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	3-04-84
Sampling location	Dragline 2400
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2806-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.49		
Ash	%	14.54	14.76	
Volatile	%	34.15	34.67	40.68
Fixed carbon	%	49.81	50.57	59.32
Ultimate:				
Carbon	%	68.72	69.76	81.84
Hydrogen	%	4.35	4.42	5.19
Sulphur (Pyritic)	%	(5.80)	(5.89)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(1.41)	(1.43)	(1.68)
Total	%	7.21	7.32	–
Nitrogen	%	0.81	0.82	0.96
Ash	%	14.54	14.76	–
Oxygen, by difference	%	2.88	2.92	3.43
Heating value:				
	MJ/kg	29.69	30.14	35.36
	kcal/kg	7091	7199	8445
	Btu/lb	12764	12958	15202

Hardgrove grindability index		57
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	0.63
Adherent	%	0.86

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1041	1391
Spherical	°C	1046	1407
Hemispherical	°C	1049	1410
Fluid	°C	1182	1416

Notes:

KNOX CONSTRUCTION LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	3-04-84
Sampling location	Dragline 2400
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2806-84

Ash analysis, per cent:

SiO2	27.14
Al2O3	9.39
Fe2O3	51.94
Mn3O4	–
TiO2	0.57
P2O5	1.52
CaO	3.29
MgO	–
SO3	2.52
Na2O	0.11
K2O	0.88
SrO	–
BaO	0.06
Loss on fusion (LOF)	0.70

Volatile trace element analysis ug/g (ppm)

Hg	0.29
Cl	100
F	142.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

KNOX CONSTRUCTION LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Grand Lake Power Station (NBEPC) Dragline 2400
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2807-84
Rank of coal	High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	4.33		
Ash	%	23.41	24.47	
Volatile	%	29.14	30.46	40.33
Fixed carbon	%	43.12	45.07	59.67
Ultimate:				
Carbon	%	57.73	60.34	79.89
Hydrogen	%	3.65	3.82	5.06
Sulphur (Pyritic)	%	(7.81)	(8.17)	–
(Sulphate)	%	(0.03)	(0.03)	–
(Organic)	%	(0.97)	(1.02)	(1.35)
Total	%	8.81	9.21	–
Nitrogen	%	0.66	0.69	0.91
Ash	%	23.41	24.47	–
Oxygen, by difference	%	1.41	1.47	1.95
Heating value:				
	MJ/kg	25.18	26.32	34.85
	kcal/kg	6015	6287	8323
	Btu/lb	10827	11316	14982

Hardgrove grindability index		
Free swelling index (FSI)		6.5
Moisture (as rec'd)		
Inherent	%	0.66
Adherent	%	3.67

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1046	1371
Spherical	°C	1052	1407
Hemispherical	°C	1054	1410
Fluid	°C	1113	1413

Notes:

KNOX CONSTRUCTION LIMITED

Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Grand Lake Power Station (NBEPC) Dragline 2400
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2807-84

Ash analysis, per cent:

SiO_2	32.41
Al_2O_3	10.52
Fe_2O_3	43.65
Mn_3O_4	-
TiO_2	0.50
P_2O_5	0.63
CaO	3.36
MgO	0.82
SO_3	4.38
Na_2O	0.12
K_2O	1.81
SrO	-
BaO	0.02
Loss on fusion (LOF)	0.65

Volatile trace element analysis ug/g (ppm)

Hg	0.33
Cl	100
F	102.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

KNOX CONSTRUCTION LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	3-04-84
Sampling location	Dragline 200
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2808-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	1.82		
Ash	%	15.25	15.53	
Volatile	%	32.58	33.19	39.29
Fixed carbon	%	50.35	51.28	60.71
Ultimate:				
Carbon	%	67.33	68.58	81.19
Hydrogen	%	4.20	4.28	5.07
Sulphur (Pyritic)	%	(7.14)	(7.28)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.94)	(0.96)	(1.13)
Total	%	8.08	8.23	-
Nitrogen	%	0.80	0.81	0.96
Ash	%	15.25	15.53	-
Oxygen, by difference	%	2.52	2.57	3.04
Heating value:				
	MJ/kg	29.25	29.79	35.27
	kcal/kg	6986	7116	8424
	Btu/lb	12575	12808	15163

Hardgrove grindability index		61
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	0.62
Adherent	%	1.20

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1035	1377
Spherical	°C	1038	1418
Hemispherical	°C	1043	1427
Fluid	°C	1138	1432

Notes:

KNOX CONSTRUCTION LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	3-04-84
Sampling location	Dragline 200
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2808-84

Ash analysis, per cent:

SiO2	19.90
Al2O3	6.71
Fe2O3	57.13
Mn3O4	–
TiO2	0.33
P2O5	2.33
CaO	5.97
MgO	–
SO3	4.67
Na2O	0.12
K2O	0.37
SrO	–
BaO	0.01
Loss on fusion (LOF)	0.74

Volatile trace element analysis ug/g (ppm)

Hg	0.27
Cl	300
F	275.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

KNOX CONSTRUCTION LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Grand Lake Power Station (NBEPC) Dragline 200
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2809-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	4.19		
Ash	%	26.03	27.17	
Volatile	%	27.85	29.07	39.91
Fixed carbon	%	41.93	43.76	60.09
Ultimate:				
Carbon	%	55.26	57.67	79.18
Hydrogen	%	3.49	3.64	5.00
Sulphur (Pyritic)	%	(8.59)	(8.97)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.46)	(0.48)	(0.66)
Total	%	9.05	9.45	-
Nitrogen	%	0.67	0.70	0.96
Ash	%	26.03	27.17	-
Oxygen, by difference	%	1.31	1.37	1.88
Heating value:				
	MJ/kg	24.12	25.17	34.56
	kcal/kg	5760	6012	8254
	Btu/lb	10368	10821	14858

Hardgrove grindability index		60
Free swelling index (FSI)		6.0
Moisture (as rec'd)		
Inherent	%	0.62
Adherent	%	3.57

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1049	1341
Spherical	°C	1052	1399
Hemispherical	°C	1121	1402
Fluid	°C	1199	1410

Notes:

KNOX CONSTRUCTION LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Grand Lake Power Station (NBEPC) Dragline 200
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2809-84

Ash analysis, per cent:

SiO_2	33.06
Al_2O_3	12.42
Fe_2O_3	40.88
Mn_3O_4	–
TiO_2	0.55
P_2O_5	0.65
CaO	3.26
MgO	0.90
SO_3	4.11
Na_2O	0.22
K_2O	1.83
SrO	–
BaO	0.01
Loss on fusion (LOF)	0.64

Volatile trace element analysis ug/g (ppm)

Hg	0.40
Cl	250
F	159.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

KNOX CONSTRUCTION LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	2-05-84
Sampling location	Dragline 4500
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3172-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	4.74		
Ash	%	19.66	20.64	
Volatile	%	29.58	31.05	39.12
Fixed carbon	%	46.02	48.31	60.88
Ultimate:				
Carbon	%	61.16	64.21	80.91
Hydrogen	%	4.11	4.31	5.43
Sulphur (Pyritic)	%	(5.24)	(5.50)	-
(Sulphate)	%	(0.05)	(0.05)	-
(Organic)	%	(3.46)	(3.64)	(4.58)
Total	%	8.75	9.19	-
Nitrogen	%	0.89	0.93	1.17
Ash	%	19.66	20.64	-
Oxygen, by difference	%	0.69	0.72	0.91
Heating value:				
	MJ/kg	26.88	28.22	35.56
	kcal/kg	6420	6739	8492
	Btu/lb	11556	12131	15286

Hardgrove grindability index		59
Free swelling index (FSI)		6.0
Moisture (as rec'd)		
Inherent	%	0.95
Adherent	%	3.79

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1035	1374
Spherical	°C	1041	1399
Hemispherical	°C	1043	1410
Fluid	°C	1138	1418

Notes:

KNOX CONSTRUCTION LIMITED
Dragline Operations; Minto/Chipman Area; Minto Coalfield
Minto, Sunbury/Queens Counties, New Brunswick

Sampling date	2-05-84
Sampling location	Dragline 4500
Product name	Seam Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3172-84

Ash analysis, per cent:

SiO2	29.38
Al2O3	9.83
Fe2O3	49.73
Mn3O4	-
TiO2	0.55
P2O5	0.97
CaO	3.69
MgO	0.53
SO3	2.27
Na2O	0.10
K2O	0.58
SrO	-
BaO	-
Loss on fusion (LOF)	0.59

Volatile trace element analysis ug/g (ppm)

Hg	0.44
Cl	180
F	151.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba
Sr
V
Mn
Cr

Notes:

R. MILLS COAL COMPANY
Coal Reclamation Project; Waste Dumps; Minto Coalfield
Midlands, Sunbury/Queens Counties, New Brunswick

Sampling date	6-04-84
Sampling location	Pilot Recovery Plant (stockpile)
Product name	Fines
Screen opening ,mm	Minus 6.4 ,sq
(Screen opening ,in)	Minus 1/4 ,sq
ERL number	2810-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	13.35		
Ash	%	24.89	28.72	
Volatile	%	23.48	27.09	38.01
Fixed carbon	%	38.29	44.19	61.99
Ultimate:				
Carbon	%	49.97	57.67	80.91
Hydrogen	%	3.13	3.61	5.06
Sulphur (Pyritic)	%	(4.33)	(4.99)	-
(Sulphate)	%	(0.08)	(0.09)	-
(Organic)	%	(0.43)	(0.50)	(0.69)
Total	%	4.84	5.58	-
Nitrogen	%	0.57	0.66	0.93
Ash	%	24.89	28.72	-
Oxygen, by difference	%	3.26	3.76	5.27
Heating value:				
	MJ/kg	21.22	24.49	34.35
	kcal/kg	5068	5848	8205
	Btu/lb	9122	10527	14769

Hardgrove grindability index

Free swelling index (FSI) 6.0

Moisture (as rec'd)		
Inherent	%	0.92
Adherent	%	12.43

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1088	1316
Spherical	°C	1160	1382
Hemispherical	°C	1271	1404
Fluid	°C	1282	1438

Notes:

R. MILLS COAL COMPANY
Coal Reclamation Project; Waste Dumps; Minto Coalfield
Midlands, Sunbury/Queens Counties, New Brunswick

```
---------------------------------------------------------------------------
Sampling date
Sampling location                              6-04-84
                                          Pilot Recovery Plant
                                              (stockpile)
Product name
Screen opening ,mm                              Fines
(Screen opening ,in)                       Minus 6.4 ,sq
                                           Minus 1/4 ,sq
ERL number
---------------------------------------------------------------------------
                                                2810-84
Ash analysis, per cent:
---------------------------------------------------------------------------

   SiO2
   Al2O3                                         49.38
   Fe2O3                                         18.01
   Mn3O4                                         22.59
   TiO2                                            -
   P2O5                                           0.87
   CaO                                            0.45
   MgO                                            1.01
   SO3                                            0.95
   Na2O                                           1.20
   K2O                                            0.23
   SrO                                            2.66
   BaO                                             -
   Loss on fusion (LOF)                           0.04
                                                  0.97
---------------------------------------------------------------------------

Volatile trace element analysis ug/g (ppm)

   Hg
   Cl                                            0.36
   F                                           160
   Br                                          175.
   As                                              -
   Se                                              -
                                                   -

Non-volatile trace element analysis ug/g (ppm)

   Ba
   Sr
   V
   Mn
   Cr

---------------------------------------------------------------------------
Notes:
---------------------------------------------------------------------------
```

R. MILLS COAL COMPANY
Coal Reclamation Project; Waste Dumps; Minto Coalfield
Midlands, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Grand Lake Power Station (NBEPC)
Product name	Fines
Screen opening ,mm	Minus 6.4 ,sq
(Screen opening ,in)	Minus 1/4 ,sq
ERL number	2811-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	15.04		
Ash	%	24.29	28.59	
Volatile	%	23.60	27.77	38.89
Fixed carbon	%	37.07	43.64	61.11
Ultimate:				
Carbon	%	49.09	57.78	80.91
Hydrogen	%	3.08	3.62	5.07
Sulphur (Pyritic)	%	(4.26)	(5.02)	-
(Sulphate)	%	(0.08)	(0.09)	-
(Organic)	%	(0.45)	(0.54)	(0.75)
Total	%	4.80	5.65	-
Nitrogen	%	0.53	0.62	0.87
Ash	%	24.29	28.59	-
Oxygen, by difference	%	3.18	3.74	5.24
Heating value:				
	MJ/kg	20.87	24.56	34.40
	kcal/kg	4985	5867	8216
	Btu/lb	8973	10561	14789

Hardgrove grindability index		
Free swelling index (FSI)		6.0
Moisture (as rec'd)		
Inherent	%	0.85
Adherent	%	14.19

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1077	1310
Spherical	°C	1146	1385
Hemispherical	°C	1252	1399
Fluid	°C	1274	1429

Notes:

R. MILLS COAL COMPANY
Coal Reclamation Project; Waste Dumps; Minto Coalfield
Midlands, Sunbury/Queens Counties, New Brunswick

Sampling date	4-04-84
Sampling location	Grand Lake Power Station (NBEPC)
Product name	Fines
Screen opening ,mm	Minus 6.4 ,sq
(Screen opening ,in)	Minus 1/4 ,sq
ERL number	2811-84

Ash analysis, per cent:

SiO_2	49.19
Al_2O_3	17.70
Fe_2O_3	22.70
Mn_3O_4	-
TiO_2	0.86
P_2O_5	0.50
CaO	1.01
MgO	1.03
SO_3	1.19
Na_2O	0.24
K_2O	2.64
SrO	-
BaO	0.21
Loss on fusion (LOF)	0.51

Volatile trace element analysis ug/g (ppm)

Hg	0.34
Cl	140
F	179.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba
Sr
V
Mn
Cr

Notes:

COAL ANALYSES – SASKATCHEWAN

BIENFAIT COAL CO. LTD.
Bienfait Mine; Top Main Seam; Estevan Coalfield
Bienfait, Saskatchewan

Sampling date	2-08-84
Sampling location	Mine (surface) Cut 33
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3897-84

Rank of coal	Lignite A		
Proximate analysis:	As Rec'd	Dry	Dry Ash Free
Equilibrium moisture .... %	32.27		
Ash .... %	8.78	12.97	
Volatile .... %	27.40	40.46	46.49
Fixed carbon .... %	31.54	46.57	53.51
Ultimate:			
Carbon .... %	42.30	62.45	71.76
Hydrogen .... %	2.87	4.24	4.87
Sulphur (Pyritic) .... %	(0.03)	(0.04)	–
(Sulphate) .... %	(0.00)	(0.00)	–
(Organic) .... %	(0.31)	(0.46)	(0.53)
Total .... %	0.34	0.50	–
Nitrogen .... %	0.70	1.03	1.18
Ash .... %	8.78	12.97	–
Oxygen, by difference ...... %	12.74	18.81	21.61
Heating value:			
MJ/kg	16.25	23.99	27.57
kcal/kg	3881	5730	6584
Btu/lb	6986	10314	11851

Hardgrove grindability index	55
Free swelling index (FSI)	N/A
Moisture (as rec'd)	
Inherent .... %	
Adherent .... %	

Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1088	1238
Spherical .... °C	1099	1329
Hemispherical .... °C	1174	1341
Fluid .... °C	1285	1457

Notes: Bienfait Coal Co. Ltd. is a subsidiary of Luscar Ltd.

BIENFAIT COAL CO. LTD.
Bienfait Mine; Top Main Seam; Estevan Coalfield
Bienfait, Saskatchewan

Sampling date	2-08-84
Sampling location	Mine (surface) Cut 33
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3897-84

Ash analysis, per cent:

SiO_2	40.66
Al_2O_3	17.03
Fe_2O_3	4.11
Mn_3O_4	-
TiO_2	1.12
P_2O_5	0.22
CaO	14.73
MgO	2.98
SO_3	8.03
Na_2O	8.31
K_2O	0.60
SrO	0.47
BaO	1.21
Loss on fusion (LOF)	0.61

Volatile trace element analysis ug/g (ppm)

Hg	0.08
Cl	60
F	48.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

BIENFAIT COAL CO. LTD.

Bienfait Mine; Top Seam; Estevan Coalfield
Bienfait, Saskatchewan

Sampling date	2-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3898-84

Rank of coal .... Lignite A

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	31.70		
Ash	%	8.84	12.95	
Volatile	%	28.33	41.48	47.65
Fixed carbon	%	31.12	45.57	52.35
Ultimate:				
Carbon	%	42.52	62.26	71.52
Hydrogen	%	3.02	4.42	5.08
Sulphur (Pyritic)	%	(0.32)	(0.47)	–
(Sulphate)	%	(0.09)	(0.13)	–
(Organic)	%	(0.84)	(1.23)	(1.41)
Total	%	1.24	1.82	–
Nitrogen	%	0.64	0.93	1.07
Ash	%	8.84	12.95	–
Oxygen, by difference	%	12.03	17.62	20.24
Heating value:				
	MJ/kg	16.68	24.42	28.05
	kcal/kg	3983	5832	6699
	Btu/lb	7169	10497	12059

Hardgrove grindability index		54
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1013	1135
Spherical	°C	1104	1163
Hemispherical	°C	1121	1166
Fluid	°C	1160	1204

Notes: Bienfait Coal Co. Ltd. is a subsidiary of Luscar Ltd.

BIENFAIT COAL CO. LTD.
Bienfait Mine; Top Seam; Estevan Coalfield
Bienfait, Saskatchewan

Sampling date	2-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3898-84

Ash analysis, per cent:

SiO_2	37.49
Al_2O_3	10.57
Fe_2O_3	8.54
Mn_3O_4	-
TiO_2	0.83
P_2O_5	-
CaO	12.39
MgO	2.28
SO_3	17.76
Na_2O	7.89
K_2O	0.62
SrO	0.33
BaO	0.61
Loss on fusion (LOF)	2.22

Volatile trace element analysis ug/g (ppm)

Hg	0.16
Cl	40
F	31.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

BIENFAIT COAL CO. LTD.
Bienfait Mine; Lower Main Seam; Estevan Coalfield
Bienfait, Saskatchewan

Sampling date	2-08-84
Sampling location	Mine (surface) Cut 33, Stn# 9
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3899-84

Rank of coal	Lignite A		

	As Rec'd	Dry	Dry Ash Free
Proximate analysis:			
Equilibrium moisture .... %	32.18		
Ash .... %	6.93	10.22	
Volatile .... %	27.20	40.11	44.68
Fixed carbon .... %	33.69	49.67	55.32
Ultimate:			
Carbon .... %	43.15	63.63	70.87
Hydrogen .... %	2.94	4.34	4.83
Sulphur (Pyritic) .... %	(0.02)	(0.03)	-
(Sulphate) .... %	(0.00)	(0.00)	-
(Organic) .... %	(0.27)	(0.39)	(0.44)
Total .... %	0.28	0.42	-
Nitrogen .... %	0.65	0.96	1.07
Ash .... %	6.93	10.22	-
Oxygen, by difference ...... %	13.86	20.43	22.76
Heating value:			
MJ/kg	16.73	24.67	27.48
kcal/kg	3996	5893	6564
Btu/lb	7194	10607	11814

Hardgrove grindability index	58	
Free swelling index (FSI)	N/A	
Moisture (as rec'd)		
Inherent .... %		
Adherent .... %		

Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1124	1299
Spherical .... °C	1166	1393
Hemispherical .... °C	1182	1399
Fluid .... °C	1229	1413

Notes: Bienfait Coal Co. Ltd. is a subsidiary of Luscar Ltd.

BIENFAIT COAL CO. LTD.
Bienfait Mine; Lower Main Seam; Estevan Coalfield
Bienfait, Saskatchewan

Sampling date	
Sampling location	2-08-84 Mine (surface) Cut 33, Stn# 9
Product name	
Screen opening ,mm	Channel Sample
(Screen opening ,in)	
ERL number	3899-84

Ash analysis, per cent:

SiO_2	
Al_2O_3	25.61
Fe_2O_3	19.89
Mn_3O_4	5.34
TiO_2	-
P_2O_5	1.16
CaO	2.57
MgO	18.56
SO_3	3.39
Na_2O	8.83
K_2O	10.30
SrO	0.15
BaO	0.79
Loss on fusion (LOF)	1.53
	1.50

Volatile trace element analysis ug/g (ppm)

Hg	
Cl	0.09
F	50
Br	39.
As	-
Se	-
	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

BIENFAIT COAL CO. LTD.
Bienfait Mine; Estevan Coal Zone; Estevan Coalfield
Bienfait, Saskatchewan

Sampling date	2-08-84
Sampling location	Mine (surface)
Product name	Mine run (crushed)
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3900-84
Rank of coal	Lignite A

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	30.86		
Ash	%	12.24	17.70	
Volatile	%	26.94	38.96	47.34
Fixed carbon	%	29.97	43.34	52.66
Ultimate:				
Carbon	%	40.62	58.75	71.39
Hydrogen	%	2.77	4.01	4.87
Sulphur (Pyritic)	%	(0.09)	(0.13)	–
(Sulphate)	%	(0.02)	(0.03)	–
(Organic)	%	(0.37)	(0.53)	(0.65)
Total	%	0.48	0.69	–
Nitrogen	%	0.67	0.97	1.18
Ash	%	12.24	17.70	–
Oxygen, by difference	%	12.36	17.88	21.73
Heating value:				
	MJ/kg	15.72	22.74	27.63
	kcal/kg	3755	5431	6599
	Btu/lb	6759	9776	11878

Hardgrove grindability index		59
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1093	1146
Spherical	°C	1135	1177
Hemispherical	°C	1263	1277
Fluid	°C	1416	1429

Notes: Bienfait Coal Co. Ltd. is a subsidiary of Luscar Ltd.

BIENFAIT COAL CO. LTD.
Bienfait Mine; Estevan Coal Zone; Estevan Coalfield
Bienfait, Saskatchewan

Sampling date	2-08-84
Sampling location	Mine (surface)
Product name	Mine run (crushed)
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3900-84

Ash analysis, per cent:

SiO_2	48.03
Al_2O_3	18.14
Fe_2O_3	4.32
Mn_3O_4	-
TiO_2	1.20
P_2O_5	0.25
CaO	10.74
MgO	2.40
SO_3	6.11
Na_2O	6.44
K_2O	1.06
SrO	0.37
BaO	0.81
Loss on fusion (LOF)	0.42

Volatile trace element analysis ug/g (ppm)

Hg	0.12
Cl	50
F	68.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

MANITOBA AND SASKATCHEWAN COAL COMPANY LIMITED
Boundary Dam Mine; Estevan Seam; Estevan Coalfield
Estevan, Saskatchewan
Sec. 35, Twp. 1; R8, W2

Sampling date	3-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3902-84

Rank of coal	Lignite A

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	31.15		
Ash	%	11.50	16.71	
Volatile	%	26.95	39.15	47.00
Fixed carbon	%	30.39	44.14	53.00
Ultimate:				
Carbon	%	40.46	58.77	70.56
Hydrogen	%	2.72	3.95	4.74
Sulphur (Pyritic)	%	(0.05)	(0.07)	-
(Sulphate)	%	(0.02)	(0.03)	-
(Organic)	%	(0.28)	(0.41)	(0.49)
Total	%	0.35	0.51	-
Nitrogen	%	0.78	1.13	1.36
Ash	%	11.50	16.71	-
Oxygen, by difference	%	13.03	18.93	22.73
Heating value:				
	MJ/kg	15.53	22.56	27.09
	kcal/kg	3710	5389	6470
	Btu/lb	6678	9700	11646

Hardgrove grindability index		60
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1113	1174
Spherical	°C	1127	1332
Hemispherical	°C	1299	1366
Fluid	°C	1343	1371

Notes: Manitoba and Saskatchewan Coal Co. Ltd. is a subsidiary of Luscar Ltd.

MANITOBA AND SASKATCHEWAN COAL COMPANY LIMITED
Boundary Dam Mine; Estevan Seam; Estevan Coalfield
Estevan, Saskatchewan
Sec. 35, Twp. 1; R8, W2

Sampling date	3-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3902-84

Ash analysis, per cent:

SiO2	40.34
Al2O3	21.44
Fe2O3	3.54
Mn3O4	–
TiO2	1.01
P2O5	0.58
CaO	12.50
MgO	3.01
SO3	7.32
Na2O	7.44
K2O	0.62
SrO	0.47
BaO	1.01
Loss on fusion (LOF)	0.79

Volatile trace element analysis ug/g (ppm)

Hg	0.09
Cl	50
F	63.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

MANALTA COAL LIMITED
Costello Mine; Estevan Seam; Estevan Coalfield
Estevan, Saskatchewan

Sampling date	7-08-84
Sampling location	Mine (surface) Sampled from Railcars
Product name	Slack
Screen opening ,mm	Minus 32
(Screen opening ,in)	Minus 1 1/4
ERL number	3903-84
Rank of coal	Lignite A

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	31.55		
Ash	%	6.88	10.05	
Volatile	%	28.86	42.16	46.87
Fixed carbon	%	32.71	47.79	53.13
Ultimate:				
Carbon	%	44.69	65.29	72.58
Hydrogen	%	3.00	4.38	4.87
Sulphur (Pyritic)	%	(0.22)	(0.32)	-
(Sulphate)	%	(0.05)	(0.08)	-
(Organic)	%	(0.38)	(0.56)	(0.62)
Total	%	0.66	0.96	-
Nitrogen	%	0.77	1.12	1.25
Ash	%	6.88	10.05	-
Oxygen, by difference	%	12.46	18.20	20.23
Heating value:				
	MJ/kg	17.25	25.20	28.02
	kcal/kg	4120	6019	6691
	Btu/lb	7416	10834	12044

Hardgrove grindability index		51
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1132	1249
Spherical	°C	1179	1316
Hemispherical	°C	1193	1327
Fluid	°C	1210	1341

Notes: Costello Mine was formerly named Klimax Mine

MANALTA COAL LIMITED
Costello Mine; Estevan Seam; Estevan Coalfield
Estevan, Saskatchewan

Sampling date	7-08-84
Sampling location	Mine (surface) Sampled from Railcars
Product name	Slack
Screen opening ,mm	Minus 32
(Screen opening ,in)	Minus 1 1/4
ERL number	3903-84

Ash analysis, per cent:

SiO_2	23.72
Al_2O_3	12.63
Fe_2O_3	6.28
Mn_3O_4	-
TiO_2	0.91
P_2O_5	0.42
CaO	20.50
MgO	4.08
SO_3	18.01
Na_2O	10.70
K_2O	0.17
SrO	0.60
BaO	0.56
Loss on fusion (LOF)	1.79

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	70
F	22.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

MANALTA COAL LIMITED
Costello Mine; Estevan Seam; Estevan Coalfield
Estevan, Saskatchewan

Sampling date	7-08-84
Sampling location	Mine (surface) Pit cut 13-9-00 W 660 m, S 890 m
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3904-84

Rank of coal		Lignite A		
Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	30.92		
Ash	%	8.19	11.86	
Volatile	%	28.49	41.24	46.79
Fixed carbon	%	32.40	46.90	53.21
Ultimate:				
Carbon	%	44.27	64.08	72.70
Hydrogen	%	2.98	4.32	4.90
Sulphur (Pyritic)	%	(0.21)	(0.31)	-
(Sulphate)	%	(0.04)	(0.06)	-
(Organic)	%	(0.38)	(0.55)	(0.63)
Total	%	0.64	0.92	-
Nitrogen	%	0.84	1.21	1.37
Ash	%	8.19	11.86	-
Oxygen, by difference	%	12.16	17.61	19.98
Heating value:				
	MJ/kg	17.07	24.71	28.04
	kcal/kg	4077	5902	6696
	Btu/lb	7339	10624	12054

Hardgrove grindability index		56
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1088	1218
Spherical	°C	1174	1282
Hemispherical	°C	1177	1296
Fluid	°C	1191	1307

Notes: Costello Mine was formerly named Klimax Mine

MANALTA COAL LIMITED
Costello Mine; Estevan Seam; Estevan Coalfield
Estevan, Saskatchewan

Sampling date	7-08-84
Sampling location	Mine (surface) Pit cut 13-9-00 W 660 m, S 890 m
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3904-84

Ash analysis, per cent:

SiO_2	31.08
Al_2O_3	13.20
Fe_2O_3	4.89
Mn_3O_4	-
TiO_2	1.16
P_2O_5	0.61
CaO	18.29
MgO	4.00
SO_3	15.42
Na_2O	10.10
K_2O	0.14
SrO	0.57
BaO	1.17
Loss on fusion (LOF)	0.64

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	50
F	24.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 546 m

MANALTA COAL LIMITED
Costello Mine; Estevan Seam; Estevan Coalfield
Estevan, Saskatchewan

Sampling date	7-08-84
Sampling location	Mine (surface) Sampled from Railcars
Product name	Slack
Screen opening ,mm	Minus 38
(Screen opening ,in)	Minus 1 1/2
ERL number	3905-84
Rank of coal	Lignite A

Proximate analysis:	As Rec'd	Dry	Dry Ash Free
Equilibrium moisture .... %	31.65		
Ash .... %	7.63	11.17	
Volatile .... %	27.44	40.14	45.19
Fixed carbon .... %	33.28	48.69	54.81
Ultimate:			
Carbon .... %	44.37	64.91	73.07
Hydrogen .... %	2.90	4.25	4.78
Sulphur (Pyritic) .... %	(0.34)	(0.49)	-
(Sulphate) .... %	(0.07)	(0.10)	-
(Organic) .... %	(0.34)	(0.49)	(0.55)
Total .... %	0.74	1.08	-
Nitrogen .... %	0.77	1.13	1.27
Ash .... %	7.63	11.17	-
Oxygen, by difference ...... %	11.93	17.46	19.66
Heating value:			
MJ/kg	17.07	24.97	28.11
kcal/kg	4076	5964	6714
Btu/lb	7337	10735	12085

Hardgrove grindability index	62
Free swelling index (FSI)	N/A
Moisture (as rec'd)	
Inherent .... %	
Adherent .... %	

Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1129	1243
Spherical .... °C	1202	1288
Hemispherical .... °C	1207	1296
Fluid .... °C	1216	1318

Notes: Costello Mine was formerly named Klimax Mine

MANALTA COAL LIMITED
Costello Mine; Estevan Seam; Estevan Coalfield
Estevan, Saskatchewan

Sampling date	7-08-84
Sampling location	Mine (surface) Sampled from Railcars
Product name	Slack
Screen opening ,mm	Minus 38
(Screen opening ,in)	Minus 1 1/2
ERL number	3905-84

Ash analysis, per cent:

SiO_2	23.65
Al_2O_3	12.24
Fe_2O_3	7.27
Mn_3O_4	-
TiO_2	1.29
P_2O_5	0.11
CaO	19.30
MgO	4.33
SO_3	20.25
Na_2O	10.40
K_2O	0.15
SrO	0.54
BaO	1.85
Loss on fusion (LOF)	0.97

Volatile trace element analysis ug/g (ppm)

Hg	0.08
Cl	40
F	17.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

MANALTA COAL LIMITED
Utility Mine; Estevan Seam; Estevan Coalfield
Estevan, Saskatchewan
N.W.Qtr. Sec. 29, Twp.1; R8, 22 meridian

Sampling date	8-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3906-84

Rank of coal	Lignite A

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	32.38		
Ash	%	6.95	10.28	
Volatile	%	27.95	41.34	46.08
Fixed carbon	%	32.71	48.38	53.92
Ultimate:				
Carbon	%	43.42	64.21	71.57
Hydrogen	%	3.04	4.50	5.02
Sulphur (Pyritic)	%	(0.02)	(0.03)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.25)	(0.37)	(0.42)
Total	%	0.27	0.40	–
Nitrogen	%	0.67	0.99	1.10
Ash	%	6.95	10.28	–
Oxygen, by difference	%	13.27	19.62	21.87
Heating value:				
	MJ/kg	16.56	24.49	27.29
	kcal/kg	3955	5848	6518
	Btu/lb	7118	10527	11733

Hardgrove grindability index	60
Free swelling index (FSI)	N/A

Moisture (as rec'd)
Inherent .... %
Adherent .... %

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1116	1285
Spherical	°C	1160	1374
Hemispherical	°C	1166	1379
Fluid	°C	1179	1388

Notes: Utility Mine is owned by Sask. Power Corp. and is operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Utility Mine; Estevan Seam; Estevan Coalfield
Estevan, Saskatchewan
N.W.Qtr. Sec. 29, Twp.1; R8, 22 meridian

Sampling date	8-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3906-84

Ash analysis, per cent:

SiO2	27.36
Al2O3	18.86
Fe2O3	4.00
Mn3O4	-
TiO2	1.44
P2O5	1.51
CaO	19.15
MgO	3.82
SO3	9.13
Na2O	11.60
K2O	0.14
SrO	0.69
BaO	1.69
Loss on fusion (LOF)	0.54

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	50
F	33.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba
Sr
V
Mn
Cr

Notes:

MANALTA COAL LIMITED
Utility Mine; Estevan Seam; Estevan Coalfield
Estevan, Saskatchewan

Sampling date	2-08-84
Sampling location	Boundary Dam Power Stn. (Sask. Power Corp.) Feed Belt
Product name	Slack
Screen opening ,mm	Minus 19
(Screen opening ,in)	Minus 3/4
ERL number	3901-84

Rank of coal	Lignite A

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	30.86		
Ash	%	9.63	13.93	
Volatile	%	27.50	39.77	46.21
Fixed carbon	%	32.01	46.30	53.79
Ultimate:				
Carbon	%	42.15	60.97	70.84
Hydrogen	%	2.81	4.06	4.72
Sulphur (Pyritic)	%	(0.04)	(0.06)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.21)	(0.30)	(0.35)
Total	%	0.26	0.37	–
Nitrogen	%	0.72	1.04	1.21
Ash	%	9.63	13.93	–
Oxygen, by difference	%	13.57	19.63	22.81
Heating value:				
	MJ/kg	16.25	23.50	27.30
	kcal/kg	3881	5613	6521
	Btu/lb	6985	10103	11738

Hardgrove grindability index		54
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1116	1235
Spherical	°C	1121	1349
Hemispherical	°C	1204	1357
Fluid	°C	1441	1368

Notes: Utility Mine is owned by Sask. Power Corp. and is operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Utility Mine; Estevan Seam; Estevan Coalfield
Estevan, Saskatchewan

Sampling date	2-08-84
Sampling location	Boundary Dam Power Stn. (Sask. Power Corp.) Feed Belt
Product name	Slack
Screen opening ,mm	Minus 19
(Screen opening ,in)	Minus 3/4
ERL number	3901-84

Ash analysis, per cent:

SiO_2	40.77
Al_2O_3	20.59
Fe_2O_3	3.96
Mn_3O_4	-
TiO_2	1.34
P_2O_5	0.21
CaO	14.14
MgO	2.97
SO_3	5.19
Na_2O	8.62
K_2O	0.65
SrO	0.42
BaO	1.37
Loss on fusion (LOF)	0.58

Volatile trace element analysis ug/g (ppm)

Hg	0.08
Cl	70
F	51.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

SASKATCHEWAN POWER CORPORATION
Poplar River Mine; Hart Seam; Willow Bunch Coalfield
Estevan, Saskatchewan

Sampling date	1-08-84
Sampling location	Mine (surface) N 6305 W 145.70
Product name	Medium Lump
Screen opening ,mm	Minus 152
(Screen opening ,in)	Minus 6
ERL number	3895-84
Rank of coal	Lignite A

Proximate analysis:	As Rec'd	Dry	Dry Ash Free
Equilibrium moisture .... %	32.36		
Ash .... %	17.31	25.59	
Volatile .... %	24.40	36.08	48.49
Fixed carbon .... %	25.93	38.33	51.51
Ultimate:			
Carbon .... %	35.16	51.98	69.86
Hydrogen .... %	2.33	3.44	4.62
Sulphur (Pyritic) .... %	(0.17)	(0.25)	-
(Sulphate) .... %	(0.10)	(0.15)	-
(Organic) .... %	(0.34)	(0.51)	(0.68)
Total .... %	0.62	0.91	-
Nitrogen .... %	0.42	0.62	0.83
Ash .... %	17.31	25.59	-
Oxygen, by difference ...... %	11.81	17.46	23.46
Heating value:			
MJ/kg	12.86	19.01	25.55
kcal/kg	3071	4541	6102
Btu/lb	5528	8173	10984

Hardgrove grindability index	69
Free swelling index (FSI)	N/A
Moisture (as rec'd)	
Inherent .... %	
Adherent .... %	

Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1193	1229
Spherical .... °C	1224	1279
Hemispherical .... °C	1391	1346
Fluid .... °C	1424	1382

Notes:

SASKATCHEWAN POWER CORPORATION
Poplar River Mine; Hart Seam; Willow Bunch Coalfield
Estevan, Saskatchewan

Sampling date	1-08-84
Sampling location	Mine (surface) N 6305 W 145.70
Product name	Medium Lump
Screen opening ,mm	Minus 152
(Screen opening ,in)	Minus 6
ERL number	3895-84

Ash analysis, per cent:

SiO2	47.95
Al2O3	20.74
Fe2O3	4.58
Mn3O4	-
TiO2	0.89
P2O5	-
CaO	10.07
MgO	3.29
SO3	7.22
Na2O	0.81
K2O	1.86
SrO	0.15
BaO	0.35
Loss on fusion (LOF)	2.47

Volatile trace element analysis ug/g (ppm)

Hg	0.09
Cl	60
F	120.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 772 m

SASKATCHEWAN POWER CORPORATION
Poplar River Mine; Hart Seam; Willow Bunch Coalfield
Estevan, Saskatchewan

Sampling date	1-08-84
Sampling location	Mine (surface) N 6305 W 145.70
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3896-84
Rank of coal	Lignite A

Proximate analysis:	As Rec'd	Dry	Dry Ash Free
Equilibrium moisture .... %	33.10		
Ash .... %	10.74	16.06	
Volatile .... %	27.57	41.21	49.09
Fixed carbon .... %	28.59	42.73	50.91
Ultimate:			
Carbon .... %	38.81	58.01	69.11
Hydrogen .... %	2.59	3.87	4.61
Sulphur (Pyritic) .... %	(0.27)	(0.40)	-
(Sulphate) .... %	(0.10)	(0.14)	-
(Organic) .... %	(0.35)	(0.53)	(0.63)
Total .... %	0.72	1.08	-
Nitrogen .... %	0.45	0.68	0.81
Ash .... %	10.74	16.06	-
Oxygen, by difference ...... %	13.58	20.30	24.18
Heating value:			
MJ/kg	14.37	21.47	25.58
kcal/kg	3431	5129	6110
Btu/lb	6176	9232	10998

Hardgrove grindability index	69
Free swelling index (FSI)	N/A
Moisture (as rec'd)	
Inherent .... %	
Adherent .... %	

Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1146	1238
Spherical .... °C	1163	1246
Hemispherical .... °C	1171	1254
Fluid .... °C	1327	1418

Notes:

SASKATCHEWAN POWER CORPORATION
Poplar River Mine; Hart Seam; Willow Bunch Coalfield
Estevan, Saskatchewan

Sampling date	1-08-84
Sampling location	Mine (surface) N 6305 W 145.70
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3896-84

Ash analysis, per cent:

SiO_2	29.02
Al_2O_3	20.34
Fe_2O_3	7.51
Mn_3O_4	–
TiO_2	0.73
P_2O_5	0.24
CaO	17.93
MgO	5.32
SO_3	13.71
Na_2O	0.49
K_2O	0.73
SrO	0.27
BaO	0.29
Loss on fusion (LOF)	2.28

Volatile trace element analysis ug/g (ppm)

Hg	0.08
Cl	40
F	51.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 772 m

COAL ANALYSES – ALBERTA (PLAINS REGION)

FORESTBURG COLLIERIES LIMITED
Diplomat Mine (Mine No. 1578); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta
Sec. 2, Twp. 41; R16, W4

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2070-85
Rank of coal	Subbituminous C

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	23.18		
Ash	%	4.84	6.30	
Volatile	%	30.83	40.13	42.83
Fixed carbon	%	41.15	53.57	57.17
Ultimate:				
Carbon	%	52.77	68.69	73.31
Hydrogen	%	3.43	4.47	4.77
Sulphur (Pyritic)	%	(0.04)	(0.05)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.31)	(0.41)	(0.44)
Total	%	0.36	0.47	–
Nitrogen	%	1.18	1.54	1.64
Ash	%	4.84	6.30	–
Oxygen, by difference	%	14.23	18.53	19.78
Heating value:				
	MJ/kg	20.32	26.45	28.23
	kcal/kg	4853	6317	6742
	Btu/lb	8735	11371	12136

Hardgrove grindability index		34
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1027	1174
Spherical	°C	1154	1188
Hemispherical	°C	1177	1241
Fluid	°C	1182	1274

Notes: Forestburg Collieries Ltd. is a subsidiary of Luscar Ltd.

FORESTBURG COLLIERIES LIMITED
Diplomat Mine (Mine No. 1578); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta
Sec. 2, Twp. 41; R16, W4

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2070-85

Ash analysis, per cent:

SiO_2	36.05
Al_2O_3	14.22
Fe_2O_3	9.95
Mn_3O_4	—
TiO_2	0.56
P_2O_5	0.05
CaO	18.78
MgO	3.21
SO_3	9.81
Na_2O	0.48
K_2O	0.08
SrO	0.10
BaO	0.27
Loss on fusion (LOF)	4.07

Volatile trace element analysis ug/g (ppm)

Hg	0.02
Cl	—
F	—
Br	—
As	—
Se	—

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORESTBURG COLLIERIES LIMITED
Diplomat Mine (Mine No. 1578); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Egg
Screen opening ,mm	152 x 51
(Screen opening ,in)	6 x 2
ERL number	2069-85

Rank of coal	Subbituminous C

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	22.83		
Ash	%	11.60	15.03	
Volatile	%	28.22	36.57	43.04
Fixed carbon	%	37.35	48.40	56.96
Ultimate:				
Carbon	%	47.93	62.11	73.10
Hydrogen	%	3.29	4.26	5.01
Sulphur (Pyritic)	%	(0.06)	(0.08)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.28)	(0.37)	(0.43)
Total	%	0.34	0.44	-
Nitrogen	%	1.00	1.29	1.52
Ash	%	11.60	15.03	-
Oxygen, by difference	%	13.02	16.87	19.85
Heating value:				
	MJ/kg	18.56	24.06	28.31
	kcal/kg	4434	5746	6762
	Btu/lb	7981	10342	12171

Hardgrove grindability index		33
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1132	1252
Spherical	°C	1268	1302
Hemispherical	°C	1324	1329
Fluid	°C	1327	1388

Notes: Forestburg Collieries Ltd. is a subsidiary of Luscar Ltd.

FORESTBURG COLLIERIES LIMITED
Diplomat Mine (Mine No. 1578); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Egg
Screen opening ,mm	152 x 51
(Screen opening ,in)	6 x 2
ERL number	2069-85

Ash analysis, per cent:

SiO_2	50.23
Al_2O_3	18.01
Fe_2O_3	10.45
Mn_3O_4	-
TiO_2	0.58
P_2O_5	0.09
CaO	7.76
MgO	1.68
SO_3	5.54
Na_2O	0.51
K_2O	0.95
SrO	0.04
BaO	0.29
Loss on fusion (LOF)	1.88

Volatile trace element analysis ug/g (ppm)

Hg	0.03
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORESTBURG COLLIERIES LIMITED
Diplomat Mine (Mine No. 1578); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Nut
Screen opening ,mm	51 × 25
(Screen opening ,in)	2 × 1
ERL number	2071-85

Rank of coal .... Subbituminous C

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	24.73		
Ash	%	7.50	9.96	
Volatile	%	29.52	39.22	43.56
Fixed carbon	%	38.25	50.82	56.44
Ultimate:				
Carbon	%	49.69	66.02	73.32
Hydrogen	%	3.31	4.40	4.89
Sulphur (Pyritic)	%	(0.04)	(0.05)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.30)	(0.40)	(0.45)
Total	%	0.35	0.46	–
Nitrogen	%	1.11	1.47	1.63
Ash	%	7.50	9.96	–
Oxygen, by difference	%	13.32	17.69	19.65
Heating value:				
	MJ/kg	19.02	25.27	28.06
	kcal/kg	4542	6034	6702
	Btu/lb	8176	10862	12064

Hardgrove grindability index	33
Free swelling index (FSI)	N/A

Moisture (as rec'd)
Inherent .... %
Adherent .... %

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1129	1204
Spherical	°C	1216	1241
Hemispherical	°C	1285	1293
Fluid	°C	1316	1443

Notes: Forestburg Collieries Ltd. is a subsidiary of Luscar Ltd.

FORESTBURG COLLIERIES LIMITED
Diplomat Mine (Mine No. 1578); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Nut
Screen opening ,mm	51 x 25
(Screen opening ,in)	2 x 1
ERL number	2071-85

Ash analysis, per cent:

SiO_2	45.67
Al_2O_3	16.31
Fe_2O_3	10.00
Mn_3O_4	-
TiO_2	0.58
P_2O_5	0.12
CaO	11.68
MgO	2.23
SO_3	7.54
Na_2O	0.50
K_2O	0.41
SrO	0.07
BaO	0.40
Loss on fusion (LOF)	2.67

Volatile trace element analysis ug/g (ppm)

Hg	0.02
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORESTBURG COLLIERIES LIMITED

Diplomat Mine (Mine No. 1578); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Stoker
Screen opening ,mm	25 x 13
(Screen opening ,in)	1 x 1/2
ERL number	2072-85

Rank of coal	Subbituminous C

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	24.39		
Ash	%	5.73	7.58	
Volatile	%	30.31	40.09	43.38
Fixed carbon	%	39.57	52.33	56.62
Ultimate:				
Carbon	%	51.10	67.58	73.12
Hydrogen	%	3.41	4.51	4.88
Sulphur (Pyritic)	%	(0.04)	(0.05)	–
(Sulphate)	%	(0.02)	(0.03)	–
(Organic)	%	(0.32)	(0.42)	(0.46)
Total	%	0.38	0.50	–
Nitrogen	%	1.15	1.52	1.64
Ash	%	5.73	7.58	–
Oxygen, by difference	%	13.84	18.31	19.81
Heating value:				
	MJ/kg	19.61	25.94	28.07
	kcal/kg	4684	6196	6704
	Btu/lb	8432	11152	12067

Hardgrove grindability index		34
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1135	1166
Spherical	°C	1152	1185
Hemispherical	°C	1277	1241
Fluid	°C	1291	1316

Notes: Forestburg Collieries Ltd. is a subsidiary of Luscar Ltd.

FORESTBURG COLLIERIES LIMITED
Diplomat Mine (Mine No. 1578); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Stoker
Screen opening ,mm	25 x 13
(Screen opening ,in)	1 x 1/2
ERL number	2072-85

Ash analysis, per cent:

SiO_2	40.80
Al_2O_3	14.49
Fe_2O_3	8.48
Mn_3O_4	–
TiO_2	0.64
P_2O_5	0.16
CaO	15.85
MgO	2.55
SO_3	9.58
Na_2O	0.55
K_2O	0.11
SrO	0.11
BaO	0.28
Loss on fusion (LOF)	4.04

Volatile trace element analysis ug/g (ppm)

Hg	0.01
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORESTBURG COLLIERIES LIMITED
Diplomat Mine (Mine No. 1578); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Stoker
Screen opening ,mm	25 x 13
(Screen opening ,in)	1 x 1/2
ERL number	2072-85

Rank of coal	Subbituminous C

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	24.39		
Ash	%	5.73	7.58	
Volatile	%	30.31	40.09	43.38
Fixed carbon	%	39.57	52.33	56.62
Ultimate:				
Carbon	%	51.10	67.58	73.12
Hydrogen	%	3.41	4.51	4.88
Sulphur (Pyritic)	%	(0.04)	(0.05)	-
(Sulphate)	%	(0.02)	(0.03)	-
(Organic)	%	(0.32)	(0.42)	(0.46)
Total	%	0.38	0.50	-
Nitrogen	%	1.15	1.52	1.64
Ash	%	5.73	7.58	-
Oxygen, by difference	%	13.84	18.31	19.81
Heating value:				
	MJ/kg	19.61	25.94	28.07
	kcal/kg	4684	6196	6704
	Btu/lb	8432	11152	12067

Hardgrove grindability index		34
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1135	1166
Spherical	°C	1152	1185
Hemispherical	°C	1277	1241
Fluid	°C	1291	1316

Notes: Forestburg Collieries Ltd. is a subsidiary of Luscar Ltd.

FORESTBURG COLLIERIES LIMITED
Diplomat Mine (Mine No. 1578); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Stoker
Screen opening ,mm	25 x 13
(Screen opening ,in)	1 x 1/2
ERL number	2072-85

Ash analysis, per cent:

SiO2	40.80
Al2O3	14.49
Fe2O3	8.48
Mn3O4	–
TiO2	0.64
P2O5	0.16
CaO	15.85
MgO	2.55
SO3	9.58
Na2O	0.55
K2O	0.11
SrO	0.11
BaO	0.28
Loss on fusion (LOF)	4.04

Volatile trace element analysis ug/g (ppm)

Hg	0.01
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORESTBURG COLLIERIES LIMITED
Diplomat Mine (Mine No. 1578); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta

Sampling date	25-09-84
Sampling location	Battle River Power Station Feed Belt
Product name	Raw Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2073-85
Rank of coal	Subbituminous C

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	23.49		
Ash	%	10.34	13.51	
Volatile	%	29.61	38.70	44.75
Fixed carbon	%	36.56	47.79	55.25
Ultimate:				
Carbon	%	48.19	62.99	72.83
Hydrogen	%	3.31	4.32	4.99
Sulphur (Pyritic)	%	(0.06)	(0.08)	-
(Sulphate)	%	(0.02)	(0.03)	-
(Organic)	%	(0.34)	(0.45)	(0.52)
Total	%	0.43	0.56	-
Nitrogen	%	1.10	1.44	1.66
Ash	%	10.34	13.51	-
Oxygen, by difference	%	13.14	17.18	19.86
Heating value:				
	MJ/kg	18.71	24.45	28.27
	kcal/kg	4468	5839	6752
	Btu/lb	8042	10511	12153

Hardgrove grindability index		36
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1143	1238
Spherical	°C	1324	1279
Hemispherical	°C	1354	1316
Fluid	°C	1404	1471

Notes: Forestburg Collieries Ltd. is a subsidiary of Luscar Ltd.

FORESTBURG COLLIERIES LIMITED
Diplomat Mine (Mine No. 1578); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta

Sampling date	25-09-84
Sampling location	Battle River Power Station Feed Belt
Product name	Raw Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2073-85

Ash analysis, per cent:

SiO_2	46.19
Al_2O_3	18.35
Fe_2O_3	4.28
Mn_3O_4	-
TiO_2	0.59
P_2O_5	0.35
CaO	8.94
MgO	1.43
SO_3	0.76
Na_2O	4.21
K_2O	0.51
SrO	0.21
BaO	0.33
Loss on fusion (LOF)	12.52

Volatile trace element analysis ug/g (ppm)

Hg	0.03
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORESTBURG COLLIERIES LIMITED

Paintearth Mine (No. 1781); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta
LSD. 9, Sec. 12, Twp. 40; R16, W4

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2068-85

Rank of coal		Subbituminous C		
Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	26.10		
Ash	%	5.34	7.23	
Volatile	%	29.69	40.18	43.31
Fixed carbon	%	38.86	52.59	56.69
Ultimate:				
Carbon	%	49.85	67.46	72.72
Hydrogen	%	3.37	4.56	4.92
Sulphur (Pyritic)	%	(0.02)	(0.03)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.42)	(0.56)	(0.61)
Total	%	0.44	0.59	–
Nitrogen	%	1.01	1.36	1.47
Ash	%	5.34	7.23	–
Oxygen, by difference	%	13.89	18.80	20.27
Heating value:				
	MJ/kg	19.30	26.11	28.15
	kcal/kg	4609	6237	6723
	Btu/lb	8296	11226	12101

Hardgrove grindability index		35
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1029	1316
Spherical	°C	1138	1352
Hemispherical	°C	1143	1354
Fluid	°C	1171	1363

Notes: Forestburg Collieries Ltd. is a subsidiary of Luscar Ltd.

FORESTBURG COLLIERIES LIMITED
Paintearth Mine (No. 1781); No. 1 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta
LSD. 9, Sec. 12, Twp. 40; R16, W4

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2068-85

Ash analysis, per cent:

SiO2	31.00
Al2O3	15.25
Fe2O3	6.50
Mn3O4	–
TiO2	0.72
P2O5	1.06
CaO	17.82
MgO	1.08
SO3	12.44
Na2O	8.24
K2O	0.19
SrO	0.41
BaO	0.91
Loss on fusion (LOF)	2.61

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORESTBURG COLLIERIES LIMITED
Paintearth Mine (No. 1781); No. 3 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta
LSD. 12, Twp. 40; R15, W4

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2066-85

Rank of coal .... Subbituminous C

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	24.97		
Ash	%	8.75	11.66	
Volatile	%	28.47	37.94	42.95
Fixed carbon	%	37.82	50.40	57.05
Ultimate:				
Carbon	%	48.27	64.34	72.83
Hydrogen	%	3.38	4.50	5.09
Sulphur (Pyritic)	%	(0.05)	(0.07)	-
(Sulphate)	%	(0.02)	(0.03)	-
(Organic)	%	(0.40)	(0.53)	(0.60)
Total	%	0.47	0.62	-
Nitrogen	%	1.08	1.44	1.63
Ash	%	8.75	11.66	-
Oxygen, by difference	%	13.09	17.44	19.74
Heating value:				
	MJ/kg	19.32	25.76	29.16
	kcal/kg	4616	6152	6964
	Btu/lb	8308	11073	12535

Hardgrove grindability index		36
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1121	1193
Spherical	°C	1229	1246
Hemispherical	°C	1393	1299
Fluid	°C	1396	1482+

Notes: Forestburg Collieries Ltd. is a subsidiary of Luscar Ltd.

FORESTBURG COLLIERIES LIMITED
Paintearth Mine (No. 1781); No. 3 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta
LSD. 12, Twp. 40; R15, W4

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2066-85

Ash analysis, per cent:

SiO_2	49.25
Al_2O_3	17.21
Fe_2O_3	4.28
Mn_3O_4	–
TiO_2	0.56
P_2O_5	0.27
CaO	10.44
MgO	1.46
SO_3	6.67
Na_2O	4.23
K_2O	0.39
SrO	0.19
BaO	0.31
Loss on fusion (LOF)	2.90

Volatile trace element analysis ug/g (ppm)

Hg	0.02
Cl	80
F	34.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORESTBURG COLLIERIES LIMITED
Paintearth Mine (No. 1781); No. 4 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta
LSD. 13, Sec. 7, Twp. 40; R15, W4

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2067-85

Rank of coal	Subbituminous C

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	25.14		
Ash	%	5.55	7.41	
Volatile	%	28.96	38.69	41.79
Fixed carbon	%	40.35	53.90	58.21
Ultimate:				
Carbon	%	50.23	67.10	72.47
Hydrogen	%	3.37	4.50	4.86
Sulphur (Pyritic)	%	(0.02)	(0.03)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.33)	(0.45)	(0.48)
Total	%	0.37	0.49	–
Nitrogen	%	1.00	1.33	1.44
Ash	%	5.55	7.41	–
Oxygen, by difference	%	14.35	19.17	20.70
Heating value:				
	MJ/kg	19.37	25.87	27.94
	kcal/kg	4626	6179	6673
	Btu/lb	8326	11122	12012

Hardgrove grindability index		34
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1068	1143
Spherical	°C	1116	1171
Hemispherical	°C	1304	1229
Fluid	°C	1307	1316

Notes: Forestburg Collieries Ltd. is a subsidiary of Luscar Ltd.

FORESTBURG COLLIERIES LIMITED
Paintearth Mine (No. 1781); No. 4 Seam; Battle River Coalfield
Forestburg, Plains Region, Alberta
LSD. 13, Sec. 7, Twp. 40; R15, W4

Sampling date	25-09-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2067-85

Ash analysis, per cent:

SiO2	41.79
Al2O3	15.38
Fe2O3	5.23
Mn3O4	–
TiO2	0.73
P2O5	1.50
CaO	15.10
MgO	1.07
SO3	8.43
Na2O	4.30
K2O	0.43
SrO	0.41
BaO	0.71
Loss on fusion (LOF)	3.25

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	80
F	28.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

MANALTA COAL LIMITED
Vesta Mine (Mine No. 1046): No. 1 Seam; Battle River Coalfield
Halkirk, Plains Region, Alberta

Sampling date	21-09-84
Sampling location	Mine (surface) 5811700 N 422180 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2063-85
Rank of coal	Subbituminous C

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	25.28		
Ash	%	10.23	13.69	
Volatile	%	28.60	38.28	44.35
Fixed carbon	%	35.89	48.03	55.65
Ultimate:				
Carbon	%	46.22	61.86	71.67
Hydrogen	%	3.12	4.17	4.83
Sulphur (Pyritic)	%	(0.03)	(0.04)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.31)	(0.42)	(0.49)
Total	%	0.36	0.48	–
Nitrogen	%	0.99	1.33	1.54
Ash	%	10.23	13.69	–
Oxygen, by difference	%	13.80	18.47	21.40
Heating value:				
	MJ/kg	17.73	23.73	27.49
	kcal/kg	4235	5667	6566
	Btu/lb	7622	10201	11819

Hardgrove grindability index	42
Free swelling index (FSI)	N/A

Moisture (as rec'd)
Inherent .... %
Adherent .... %

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1124	1143
Spherical	°C	1160	1182
Hemispherical	°C	1282	1274
Fluid	°C	1329	1452

Notes:

MANALTA COAL LIMITED
Vesta Mine (Mine No. 1046); No. 1 Seam; Battle River Coalfield
Halkirk, Plains Region, Alberta

Sampling date	21-09-84
Sampling location	Mine (surface) 5811700 N 422180 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2063-85

Ash analysis, per cent:

SiO_2	55.80
Al_2O_3	12.23
Fe_2O_3	3.96
Mn_3O_4	—
TiO_2	0.65
P_2O_5	0.28
CaO	10.87
MgO	2.13
SO_3	5.63
Na_2O	2.47
K_2O	1.17
SrO	0.14
BaO	0.34
Loss on fusion (LOF)	2.37

Volatile trace element analysis ug/g (ppm)

Hg	0.02
Cl	80
F	53.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 745.6 m

MANALTA COAL LIMITED
Vesta Mine (Mine No. 1046); No. 2 Seam; Battle River Coalfield
Halkirk, Plains Region, Alberta

Sampling date	21-09-84
Sampling location	Mine (surface) 5811700 N 422110 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2064-85

Rank of coal		Subbituminous C		
Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	22.92		
Ash	%	10.81	14.03	
Volatile	%	28.70	37.24	43.32
Fixed carbon	%	37.56	48.73	56.68
Ultimate:				
Carbon	%	48.21	62.54	72.75
Hydrogen	%	3.39	4.40	5.12
Sulphur (Pyritic)	%	(0.06)	(0.08)	-
(Sulphate)	%	(0.02)	(0.03)	-
(Organic)	%	(0.30)	(0.39)	(0.45)
Total	%	0.39	0.50	-
Nitrogen	%	1.12	1.45	1.69
Ash	%	10.81	14.03	-
Oxygen, by difference	%	13.17	17.08	19.87
Heating value:				
	MJ/kg	18.73	24.30	28.26
	kcal/kg	4473	5803	6750
	Btu/lb	8051	10445	12150

Hardgrove grindability index		36	
Free swelling index (FSI)		N/A	
Moisture (as rec'd)			
Inherent	%		
Adherent	%		
Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1154	1246
Spherical	°C	1374	1304
Hemispherical	°C	1391	1335
Fluid	°C	1482+	1393

Notes:

MANALTA COAL LIMITED
Vesta Mine (Mine No. 1046); No. 2 Seam; Battle River Coalfield
Halkirk, Plains Region, Alberta

Sampling date	21-09-84
Sampling location	Mine (surface) 5811700 N 422110 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2064-85

Ash analysis, per cent:

SiO_2	48.11
Al_2O_3	21.04
Fe_2O_3	4.04
Mn_3O_4	-
TiO_2	0.69
P_2O_5	0.33
CaO	9.08
MgO	1.31
SO_3	4.82
Na_2O	5.58
K_2O	0.43
SrO	0.20
BaO	0.60
Loss on fusion (LOF)	2.37

Volatile trace element analysis ug/g (ppm)

Hg	0.03
Cl	70
F	45.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 743.4 m

MANALTA COAL LIMITED
Vesta Mine (Mine No. 1046); No. 3 Seam; Battle River Coalfield
Halkirk, Plains Region, Alberta

Sampling date	21-09-84
Sampling location	Mine (surface) 5811735 N 421075 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2065-85

Rank of coal	Subbituminous C

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	20.47		
Ash	%	14.44	18.16	
Volatile	%	28.73	36.13	44.15
Fixed carbon	%	36.35	45.71	55.85
Ultimate:				
Carbon	%	46.89	58.96	72.04
Hydrogen	%	3.28	4.13	5.05
Sulphur (Pyritic)	%	(0.07)	(0.08)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.28)	(0.36)	(0.43)
Total	%	0.35	0.44	–
Nitrogen	%	1.21	1.52	1.86
Ash	%	14.44	18.16	–
Oxygen, by difference	%	13.35	16.79	20.52
Heating value:				
	MJ/kg	18.12	22.78	27.83
	kcal/kg	4327	5441	6648
	Btu/lb	7788	9793	11966

Hardgrove grindability index		40
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1204	1268
Spherical	°C	1288	1335
Hemispherical	°C	1393	1429
Fluid	°C	1482+	1482+

Notes:

MANALTA COAL LIMITED
Vesta Mine (Mine No. 1046); No. 3 Seam; Battle River Coalfield
Halkirk, Plains Region, Alberta

Sampling date	21-09-84
Sampling location	Mine (surface) 5811735 N 421075 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2065-85

Ash analysis, per cent:

SiO_2	54.75
Al_2O_3	20.66
Fe_2O_3	3.34
Mn_3O_4	-
TiO_2	0.73
P_2O_5	0.12
CaO	6.94
MgO	0.72
SO_3	3.60
Na_2O	4.27
K_2O	1.06
SrO	0.17
BaO	0.76
Loss on fusion (LOF)	1.80

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	80
F	43.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 712.6 m

MANALTA COAL LIMITED
Montgomery Mine (Mine No. 443); No. 1 Seam; Sheerness Coalfield
Hanna, Plains Region, Alberta

Sampling date	21-09-84
Sampling location	Mine (surface) 5704087 N 49642 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2062-85

Rank of coal	Subbituminous C

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	26.11		
Ash	%	6.13	8.30	
Volatile	%	29.28	39.63	43.22
Fixed carbon	%	38.47	52.07	56.78
Ultimate:				
Carbon	%	48.43	65.54	71.47
Hydrogen	%	3.25	4.40	4.80
Sulphur (Pyritic)	%	(0.05)	(0.06)	–
(Sulphate)	%	(0.04)	(0.05)	–
(Organic)	%	(0.37)	(0.51)	(0.55)
Total	%	0.46	0.62	–
Nitrogen	%	1.14	1.54	1.68
Ash	%	6.13	8.30	–
Oxygen, by difference	%	14.48	19.60	21.37
Heating value:				
	MJ/kg	18.67	25.27	27.55
	kcal/kg	4459	6034	6581
	Btu/lb	8026	10862	11845

Hardgrove grindability index		39
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1116	1199
Spherical	°C	1179	1210
Hemispherical	°C	1293	1266
Fluid	°C	1363	1346

Notes: Montgomery Mine was formerly named Roselyn Mine

MANALTA COAL LIMITED
Montgomery Mine (Mine No. 443); No. 1 Seam; Sheerness Coalfield
Hanna, Plains Region, Alberta

Sampling date	21-09-84
Sampling location	Mine (surface) 5704087 N 49642 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2062-85

Ash analysis, per cent:

SiO2	33.09
Al2O3	19.31
Fe2O3	6.34
Mn3O4	-
TiO2	0.94
P2O5	0.22
CaO	18.39
MgO	2.59
SO3	11.32
Na2O	1.45
K2O	0.32
SrO	0.24
BaO	0.58
Loss on fusion (LOF)	3.01

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	80
F	26.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 826.7 m

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Seam No. 1; Wabamun Coalfield
Seba Beach, Plains Region, Alberta
N.E Qtr. Sec. 32, Twp. 52; R5, W5M

Sampling date	11-12-84
Sampling location	Mine (surface) Pit 04
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2363-85

Rank of coal	Subbituminous B

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	18.84		
Ash	%	13.13	16.18	
Volatile	%	28.00	34.50	41.16
Fixed carbon	%	40.03	49.32	58.84
Ultimate:				
Carbon	%	50.08	61.70	73.61
Hydrogen	%	3.13	3.86	4.61
Sulphur (Pyritic)	%	(0.04)	(0.05)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.14)	(0.17)	(0.20)
Total	%	0.18	0.22	-
Nitrogen	%	0.71	0.87	1.04
Ash	%	13.13	16.18	-
Oxygen, by difference	%	13.94	17.17	20.48
Heating value:				
	MJ/kg	19.05	23.47	28.00
	kcal/kg	4549	5605	6687
	Btu/lb	8188	10089	12037

Hardgrove grindability index		46
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1282	1360
Spherical	°C	1368	1399
Hemispherical	°C	1388	1421
Fluid	°C	1482+	1482+

Notes: Highvale Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Seam No. 1; Wabamun Coalfield
Seba Beach, Plains Region, Alberta
N.E Qtr. Sec. 32, Twp. 52; R5, W5M

Sampling date	11-12-84
Sampling location	Mine (surface) Pit 04
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2363-85

Ash analysis, per cent:

SiO_2	48.94
Al_2O_3	25.20
Fe_2O_3	3.44
Mn_3O_4	–
TiO_2	0.71
P_2O_5	0.10
CaO	12.37
MgO	0.84
SO_3	3.41
Na_2O	2.89
K_2O	0.25
SrO	0.11
BaO	0.21
Loss on fusion (LOF)	0.62

Volatile trace element analysis ug/g (ppm)

Hg	0.11
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 715 m

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Seam No. 2; Wabamun Coalfield
Seba Beach, Plains Region, Alberta
N.E. Qtr. Sec. 32, Twp. 52; R5, W5M

Sampling date	11-12-84
Sampling location	Mine (surface) Pit 04
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2364-85

Rank of coal .... Subbituminous C

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	19.41		
Ash	%	13.56	16.82	
Volatile	%	27.59	34.24	41.16
Fixed carbon	%	39.44	48.94	58.84
Ultimate:				
Carbon	%	48.89	60.66	72.93
Hydrogen	%	3.06	3.80	4.57
Sulphur (Pyritic)	%	(0.05)	(0.06)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.08)	(0.10)	(0.12)
Total	%	0.13	0.16	-
Nitrogen	%	0.64	0.80	0.96
Ash	%	13.56	16.82	-
Oxygen, by difference	%	14.31	17.76	21.35
Heating value:				
	MJ/kg	18.53	22.99	27.64
	kcal/kg	4425	5491	6601
	Btu/lb	7965	9883	11881

Hardgrove grindability index		43
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1210	1302
Spherical	°C	1296	1354
Hemispherical	°C	1360	1371
Fluid	°C	1379	1449

Notes: Highvale Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Seam No. 2; Wabamun Coalfield
Seba Beach, Plains Region, Alberta
N.E. Qtr. Sec. 32, Twp. 52; R5, W5M

Sampling date	11-12-84
Sampling location	Mine (surface) Pit 04
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2364-85

Ash analysis, per cent:

SiO_2	46.66
Al_2O_3	22.63
Fe_2O_3	5.73
Mn_3O_4	–
TiO_2	0.76
P_2O_5	0.17
CaO	13.00
MgO	1.06
SO_3	2.88
Na_2O	0.07
K_2O	0.27
SrO	–
BaO	0.11
Loss on fusion (LOF)	1.49

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 705 m

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Seam No. 3; Wabamun Coalfield
Seba Beach, Plains Region, Alberta
N.W. Qtr. Pit 4, Twp. 52; R4, W5M

Sampling date	11-12-84
Sampling location	Mine (surface) Pit 02 South
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2365-85
Rank of coal	Subbituminous B

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	19.33		
Ash	%	8.74	10.84	
Volatile	%	28.41	35.22	39.50
Fixed carbon	%	43.51	53.94	60.50
Ultimate:				
Carbon	%	53.19	65.93	73.95
Hydrogen	%	3.23	4.01	4.50
Sulphur (Pyritic)	%	(0.04)	(0.05)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.26)	(0.32)	(0.36)
Total	%	0.30	0.37	-
Nitrogen	%	0.74	0.92	1.03
Ash	%	8.74	10.84	-
Oxygen, by difference	%	14.46	17.93	20.11
Heating value:				
	MJ/kg	20.35	25.22	28.29
	kcal/kg	4860	6024	6757
	Btu/lb	8748	10844	12162

Hardgrove grindability index		45
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1091	1132
Spherical	°C	1160	1216
Hemispherical	°C	1274	1243
Fluid	°C	1391	1432

Notes: Highvale Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Seam No. 3; Wabamun Coalfield
Seba Beach, Plains Region, Alberta
N.W. Qtr. Pit 4, Twp. 52; R4, W5M

Sampling date	11-12-84
Sampling location	Mine (surface) Pit 02 South
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2365-85

Ash analysis, per cent:

SiO_2	49.54
Al_2O_3	16.10
Fe_2O_3	4.20
Mn_3O_4	-
TiO_2	0.56
P_2O_5	0.19
CaO	14.77
MgO	1.00
SO_3	6.62
Na_2O	4.59
K_2O	0.31
SrO	0.15
BaO	0.24
Loss on fusion (LOF)	0.75

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 700 m

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Seam No. 4; Wabamun Coalfield
Seba Beach, Plains Region, Alberta
N.W. Qtr. Pit 4, Twp. 52; R4, W5M

Sampling date	11-12-84
Sampling location	Mine (surface) Pit 02 South
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2366-85

Rank of coal .... Subbituminous B

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	17.38		
Ash	%	19.78	23.94	
Volatile	%	27.67	33.49	44.03
Fixed carbon	%	35.17	42.57	55.97
Ultimate:				
Carbon	%	46.26	55.99	73.61
Hydrogen	%	2.80	3.39	4.46
Sulphur (Pyritic)	%	(0.03)	(0.04)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.32)	(0.39)	(0.51)
Total	%	0.36	0.43	-
Nitrogen	%	0.65	0.79	1.04
Ash	%	19.78	23.94	-
Oxygen, by difference	%	12.77	15.46	20.33
Heating value:				
	MJ/kg	18.16	21.98	28.90
	kcal/kg	4337	5249	6902
	Btu/lb	7807	9449	12423

Hardgrove grindability index		49
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1182	1191
Spherical	°C	1304	1282
Hemispherical	°C	1416	1374
Fluid	°C	1471	1482+

Notes: Highvale Mine is owned by TransAlta Utilities Corp.and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Seam No. 4; Wabamun Coalfield
Seba Beach, Plains Region, Alberta
N.W. Qtr. Pit 4, Twp. 52; R4, W5M

Sampling date	11-12-84
Sampling location	Mine (surface) Pit 02 South
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2366-85

Ash analysis, per cent:

SiO_2	64.71
Al_2O_3	13.28
Fe_2O_3	1.23
Mn_3O_4	-
TiO_2	0.49
P_2O_5	0.28
CaO	9.75
MgO	0.71
SO_3	3.29
Na_2O	2.16
K_2O	0.03
SrO	0.08
BaO	0.16
Loss on fusion (LOF)	1.88

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 690 m

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Seam No. 6; Wabamun Coalfield
Seba Beach, Plains Region, Alberta
N.W. Qtr. Pit 4, Twp. 52; R4, W5M

Sampling date	11-12-84
Sampling location	Mine (surface) Pit 02 South
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2367-85

Rank of coal	Subbituminous B

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	19.70		
Ash	%	12.03	14.98	
Volatile	%	28.23	35.16	41.35
Fixed carbon	%	40.04	49.86	58.65
Ultimate:				
Carbon	%	49.87	62.11	73.05
Hydrogen	%	3.28	4.09	4.81
Sulphur (Pyritic)	%	(0.06)	(0.07)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.29)	(0.36)	(0.42)
Total	%	0.35	0.43	-
Nitrogen	%	0.90	1.12	1.32
Ash	%	12.03	14.98	-
Oxygen, by difference	%	13.87	17.27	20.31
Heating value:				
	MJ/kg	19.29	24.03	28.26
	kcal/kg	4608	5738	6749
	Btu/lb	8294	10329	12149

Hardgrove grindability index	39
Free swelling index (FSI)	N/A

Moisture (as rec'd)
Inherent .... %
Adherent .... %

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1141	1271
Spherical	°C	1279	1329
Hemispherical	°C	1374	1368
Fluid	°C	1391	1446

Notes: Highvale Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED

Highvale Mine (Mine No. 1769); Seam No. 6; Wabamun Coalfield
Seba Beach, Plains Region, Alberta
N.W. Qtr. Pit 4, Twp. 52; R4, W5M

Sampling date	11-12-84
Sampling location	Mine (surface) Pit 02 South
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2367-85

Ash analysis, per cent:

SiO_2	50.73
Al_2O_3	20.22
Fe_2O_3	3.39
Mn_3O_4	–
TiO_2	0.85
P_2O_5	0.05
CaO	10.65
MgO	1.32
SO_3	4.32
Na_2O	4.23
K_2O	0.21
SrO	0.14
BaO	0.60
Loss on fusion (LOF)	1.75

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 685 m

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Wabamun Coalfield
Seba Beach, Plains Region, Alberta

Sampling date	11-12-84
Sampling location	Keephills Power Generating Station Feed Belt
Product name	Plant Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2368-85

Rank of coal	Subbituminous C

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	19.62		
Ash	%	9.48	11.80	
Volatile	%	28.74	35.76	40.54
Fixed carbon	%	42.15	52.44	59.46
Ultimate:				
Carbon	%	51.72	64.35	72.96
Hydrogen	%	3.24	4.03	4.57
Sulphur (Pyritic)	%	(0.04)	(0.05)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.14)	(0.17)	(0.20)
Total	%	0.18	0.22	–
Nitrogen	%	0.73	0.91	1.03
Ash	%	9.48	11.80	–
Oxygen, by difference	%	15.02	18.69	21.19
Heating value:				
	MJ/kg	19.77	24.59	27.88
	kcal/kg	4721	5874	6660
	Btu/lb	8499	10573	11988

Hardgrove grindability index	42
Free swelling index (FSI)	N/A
Moisture (as rec'd)	
Inherent %	
Adherent %	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1213	1282
Spherical	°C	1274	1332
Hemispherical	°C	1291	1363
Fluid	°C	1399	1438

Notes: Highvale Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Wabamun Coalfield
Seba Beach, Plains Region, Alberta

Sampling date	11-12-84
Sampling location	Keephills Power Generating Station Feed Belt
Product name	Plant Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2368-85

Ash analysis, per cent:

SiO_2	44.10
Al_2O_3	23.27
Fe_2O_3	4.66
Mn_3O_4	–
TiO_2	0.94
P_2O_5	0.12
CaO	14.74
MgO	1.00
SO_3	4.41
Na_2O	3.62
K_2O	0.42
SrO	0.15
BaO	0.78
Loss on fusion (LOF)	0.63

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	70
F	123.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Wabamun Coalfield
Seba Beach, Plains Region, Alberta

Sampling date	11-12-84
Sampling location	Sundance Power Generating Station
Product name	Plant Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2369-85

Rank of coal		Subbituminous C		
Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	19.18		
Ash	%	15.95	19.74	
Volatile	%	26.70	33.04	41.17
Fixed carbon	%	38.16	47.22	58.83
Ultimate:				
Carbon	%	47.59	58.89	73.37
Hydrogen	%	2.97	3.67	4.57
Sulphur (Pyritic)	%	(0.06)	(0.07)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.17)	(0.20)	(0.26)
Total	%	0.23	0.29	–
Nitrogen	%	0.71	0.88	1.10
Ash	%	15.95	19.74	–
Oxygen, by difference	%	13.36	16.53	20.60
Heating value:				
	MJ/kg	18.08	22.37	27.87
	kcal/kg	4318	5342	6656
	Btu/lb	7772	9616	11981

Hardgrove grindability index		48	
Free swelling index (FSI)		N/A	
Moisture (as rec'd)			
Inherent	%		
Adherent	%		
Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1193	1221
Spherical	°C	1291	1313
Hemispherical	°C	1410	1366
Fluid	°C	1466	1482+

Notes: Highvale Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Highvale Mine (Mine No. 1769); Wabamun Coalfield
Seba Beach, Plains Region, Alberta

Sampling date	11-12-84
Sampling location	Sundance Power Generating Station
Product name	Plant Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2369-85

Ash analysis, per cent:

SiO_2	56.86
Al_2O_3	18.15
Fe_2O_3	2.96
Mn_3O_4	—
TiO_2	0.67
P_2O_5	0.14
CaO	10.25
MgO	1.04
SO_3	3.51
Na_2O	2.74
K_2O	0.25
SrO	0.11
BaO	0.66
Loss on fusion (LOF)	0.76

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	—
F	—
Br	—
As	—
Se	—

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Seam No. 1; Wabamun Coalfield
Wabamun, Plains Region, Alberta
S.E. Qtr. Sec. 21, Twp. 53; R4, W5M

Sampling date	12-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2356-85
Rank of coal	Subbituminous C

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	20.54		
Ash	%	9.22	11.60	
Volatile	%	28.21	35.50	40.16
Fixed carbon	%	42.03	52.90	59.84
Ultimate:				
Carbon	%	51.54	64.86	73.37
Hydrogen	%	3.10	3.90	4.41
Sulphur (Pyritic)	%	(0.04)	(0.05)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.14)	(0.17)	(0.20)
Total	%	0.19	0.24	–
Nitrogen	%	0.77	0.97	1.10
Ash	%	9.22	11.60	–
Oxygen, by difference	%	14.64	18.43	20.85
Heating value:				
	MJ/kg	19.42	24.44	27.65
	kcal/kg	4639	5838	6604
	Btu/lb	8350	10509	11888

Hardgrove grindability index		43
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1171	1199
Spherical	°C	1196	1249
Hemispherical	°C	1202	1307
Fluid	°C	1271	1371

Notes: Whitewood Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Seam No. 1; Wabamun Coalfield
Wabamun, Plains Region, Alberta
S.E. Qtr. Sec. 21, Twp. 53; R4, W5M

Sampling date	12-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2356-85

Ash analysis, per cent:

SiO2	46.79
Al2O3	17.74
Fe2O3	3.91
Mn3O4	–
TiO2	0.53
P2O5	0.05
CaO	18.63
MgO	3.25
SO3	3.82
Na2O	0.13
K2O	0.29
SrO	0.10
BaO	0.47
Loss on fusion (LOF)	2.40

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 630 m

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Seam No. 2; Wabamun Coalfield
Wabamun, Plains Region, Alberta
N.E. Qtr. Sec. 21, Twp. 53; R4, W5M

Sampling date	12-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2357-85
Rank of coal	Subbituminous C

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	19.21		
Ash	%	13.10	16.22	
Volatile	%	28.79	35.64	42.54
Fixed carbon	%	38.89	48.14	57.46
Ultimate:				
Carbon	%	49.23	60.94	72.74
Hydrogen	%	3.16	3.91	4.67
Sulphur (Pyritic)	%	(0.05)	(0.06)	-
(Sulphate)	%	(0.01)	(0.01)	-
(Organic)	%	(0.23)	(0.28)	(0.34)
Total	%	0.28	0.35	-
Nitrogen	%	0.70	0.87	1.04
Ash	%	13.10	16.22	-
Oxygen, by difference	%	14.31	17.71	21.14
Heating value:				
	MJ/kg	18.79	23.26	27.76
	kcal/kg	4488	5556	6631
	Btu/lb	8079	10000	11936

Hardgrove grindability index		40
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1168	1210
Spherical	°C	1227	1374
Hemispherical	°C	1360	1452
Fluid	°C	1416	1482+

Notes: Whitewood Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Seam No. 2; Wabamun Coalfield
Wabamun, Plains Region, Alberta
N.E. Qtr. Sec. 21, Twp. 53; R4, W5M

Sampling date	12-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2357-85

Ash analysis, per cent:

SiO2	67.16
Al2O3	8.98
Fe2O3	3.02
Mn3O4	–
TiO2	0.31
P2O5	0.02
CaO	10.92
MgO	1.30
SO3	4.60
Na2O	0.11
K2O	0.07
SrO	0.08
BaO	0.30
Loss on fusion (LOF)	1.17

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 625 m

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Seam No. 3; Wabamun Coalfield
Wabamun, Plains Region, Alberta
N.E. Qtr. Sec. 21, Twp. 53; R4, W5M

Sampling date	12-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2353-85

Rank of coal	Subbituminous C		

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	20.88		
Ash	%	9.27	11.72	
Volatile	%	29.50	37.28	42.23
Fixed carbon	%	40.35	51.00	57.77
Ultimate:				
Carbon	%	50.98	64.43	72.98
Hydrogen	%	3.05	3.85	4.36
Sulphur (Pyritic)	%	(0.04)	(0.05)	–
(Sulphate)	%	(0.03)	(0.04)	–
(Organic)	%	(0.13)	(0.16)	(0.19)
Total	%	0.20	0.25	–
Nitrogen	%	0.72	0.91	1.03
Ash	%	9.27	11.72	–
Oxygen, by difference	%	14.91	18.84	21.34
Heating value:				
	MJ/kg	19.30	24.39	27.63
	kcal/kg	4609	5825	6598
	Btu/lb	8296	10485	11877

Hardgrove grindability index		43
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1282	1374
Spherical	°C	1354	1404
Hemispherical	°C	1360	1424
Fluid	°C	1424	1463

Notes: Whitewood Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Seam No. 3; Wabamun Coalfield
Wabamun, Plains Region, Alberta
N.E. Qtr. Sec. 21, Twp. 53; R4, W5M

Sampling date	12-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2358-85

Ash analysis, per cent:

SiO_2	40.39
Al_2O_3	24.58
Fe_2O_3	6.70
Mn_3O_4	–
TiO_2	0.91
P_2O_5	0.14
CaO	17.06
MgO	1.53
SO_3	5.35
Na_2O	0.19
K_2O	0.12
SrO	0.07
BaO	0.47
Loss on fusion (LOF)	1.08

Volatile trace element analysis ug/g (ppm)

Hg	0.03
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 624 m

MANALTA COAL LIMITED

Whitewood Mine (Mine No. 1757); Seam No. 4; Wabamun Coalfield
Wabamun, Plains Region, Alberta
N.E. Qtr. Sec. 21, Twp. 53; R4, W5M

Sampling date	12-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2359-85
Rank of coal	Subbituminous C

Proximate analysis:	As Rec'd	Dry	Dry Ash Free
Equilibrium moisture .... %	20.06		
Ash .... %	13.00	16.26	
Volatile .... %	26.74	33.45	39.95
Fixed carbon .... %	40.20	50.29	60.05
Ultimate:			
Carbon .... %	50.00	62.55	74.70
Hydrogen .... %	2.76	3.45	4.12
Sulphur (Pyritic) .... %	(0.03)	(0.04)	–
(Sulphate) .... %	(0.02)	(0.02)	–
(Organic) .... %	(0.25)	(0.31)	(0.37)
Total .... %	0.30	0.37	–
Nitrogen .... %	0.68	0.85	1.02
Ash .... %	13.00	16.26	–
Oxygen, by difference ...... %	13.21	16.52	19.73
Heating value:			
MJ/kg	18.68	23.36	27.90
kcal/kg	4461	5580	6663
Btu/lb	8029	10044	11994

Hardgrove grindability index	51
Free swelling index (FSI)	N/A
Moisture (as rec'd)	
Inherent .... %	
Adherent .... %	

Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1171	1168
Spherical .... °C	1232	1332
Hemispherical .... °C	1352	1402
Fluid .... °C	1413	1477

Notes: Whitewood Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Seam No. 4; Wabamun Coalfield
Wabamun, Plains Region, Alberta
N.E. Qtr. Sec. 21, Twp. 53; R4, W5M

Sampling date	12-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2359-85

Ash analysis, per cent:

SiO2	61.32
Al2O3	12.20
Fe2O3	2.39
Mn3O4	–
TiO2	0.38
P2O5	0.06
CaO	14.29
MgO	1.37
SO3	3.67
Na2O	0.20
K2O	–
SrO	0.11
BaO	0.46
Loss on fusion (LOF)	1.36

Volatile trace element analysis ug/g (ppm)

Hg	0.02
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 619 m

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Seam No. 5; Wabamun Coalfield
Wabamun, Plains Region, Alberta
N.E. Qtr. Sec. 21, Twp. 53; R4, W5M

Sampling date	12-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2360-85

Rank of coal .... Subbituminous C

Proximate analysis:	As Rec'd	Dry	Dry Ash Free
Equilibrium moisture .... %	13.13		
Ash .... %	53.37	61.44	
Volatile .... %	17.31	19.93	51.69
Fixed carbon .... %	16.18	18.63	48.31
Ultimate:			
Carbon .... %	22.21	25.57	66.31
Hydrogen .... %	1.97	2.27	5.89
Sulphur (Pyritic) .... %	(0.08)	(0.09)	–
(Sulphate) .... %	(0.01)	(0.01)	–
(Organic) .... %	(0.18)	(0.20)	(0.53)
Total .... %	0.27	0.31	–
Nitrogen .... %	0.34	0.39	1.01
Ash .... %	53.37	61.44	–
Oxygen, by difference ...... %	8.70	10.02	25.99
Heating value:			
MJ/kg	3.89	4.48	11.62
kcal/kg	930	1070	2775
Btu/lb	1673	1926	4995

Hardgrove grindability index	51
Free swelling index (FSI)	N/A
Moisture (as rec'd)	
Inherent .... %	
Adherent .... %	

Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1482+	1482+
Spherical .... °C	1482+	1482+
Hemispherical .... °C	1482+	1482+
Fluid .... °C	1482+	1482+

Notes: Whitewood Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Seam No. 5; Wabamun Coalfield
Wabamun, Plains Region, Alberta
N.E. Qtr. Sec. 21, Twp. 53; R4, W5M

Sampling date	12-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2360-85

Ash analysis, per cent:

SiO2	69.64
Al2O3	20.63
Fe2O3	0.74
Mn3O4	–
TiO2	1.13
P2O5	0.09
CaO	2.15
MgO	0.48
SO3	0.94
Na2O	0.39
K2O	0.49
SrO	0.03
BaO	0.38
Loss on fusion (LOF)	0.75

Volatile trace element analysis ug/g (ppm)

Hg	0.32
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 618 m

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Seam No. 6; Wabamun Coalfield
Wabamun, Plains Region, Alberta
N.E. Qtr. Sec. 21, Twp. 53; R4, W5M

Sampling date	12-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2361-85

Rank of coal .... Subbituminous B

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	20.12		
Ash	%	7.48	9.37	
Volatile	%	31.30	39.18	43.23
Fixed carbon	%	41.10	51.45	56.77
Ultimate:				
Carbon	%	53.03	66.39	73.25
Hydrogen	%	3.52	4.41	4.87
Sulphur (Pyritic)	%	(0.05)	(0.06)	-
(Sulphate)	%	(0.01)	(0.01)	-
(Organic)	%	(0.32)	(0.40)	(0.44)
Total	%	0.38	0.47	-
Nitrogen	%	0.96	1.20	1.32
Ash	%	7.48	9.37	-
Oxygen, by difference	%	14.51	18.16	20.04
Heating value:				
	MJ/kg	20.60	25.78	28.45
	kcal/kg	4919	6158	6795
	Btu/lb	8855	11085	12231

Hardgrove grindability index		36
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1166	1191
Spherical	°C	1185	1207
Hemispherical	°C	1221	1227
Fluid	°C	1285	1349

Notes: Whitewood Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Seam No. 6; Wabamun Coalfield
Wabamun, Plains Region, Alberta
N.E. Qtr. Sec. 21, Twp. 53; R4, W5M

Sampling date	12-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2361-85

Ash analysis, per cent:

SiO2	41.24
Al2O3	16.61
Fe2O3	3.95
Mn3O4	–
TiO2	0.67
P2O5	0.07
CaO	20.06
MgO	2.00
SO3	8.19
Na2O	1.11
K2O	0.10
SrO	0.15
BaO	0.68
Loss on fusion (LOF)	3.36

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 616 m

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Wabamun Coalfield
Wabamun, Plains Region, Alberta

Sampling date	12-12-84
Sampling location	Wabamun Generating Station Feed Belt
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2362-85

Rank of coal .... Subbituminous C

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	20.34		
Ash	%	15.26	19.16	
Volatile	%	27.41	34.41	42.57
Fixed carbon	%	36.99	46.43	57.43
Ultimate:				
Carbon	%	46.90	58.88	72.84
Hydrogen	%	2.99	3.75	4.64
Sulphur (Pyritic)	%	(0.08)	(0.10)	-
(Sulphate)	%	(0.02)	(0.02)	-
(Organic)	%	(0.20)	(0.24)	(0.30)
Total	%	0.29	0.37	-
Nitrogen	%	0.71	0.89	1.10
Ash	%	15.26	19.16	-
Oxygen, by difference	%	13.50	16.95	20.97
Heating value:				
	MJ/kg	17.86	22.42	27.74
	kcal/kg	4267	5356	6626
	Btu/lb	7680	9641	11926

Hardgrove grindability index 45

Free swelling index (FSI) ..... N/A

Moisture (as rec'd)
Inherent .... %
Adherent .... %

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1174	1249
Spherical	°C	1274	1332
Hemispherical	°C	1379	1360
Fluid	°C	1454	1482+

Notes: Whitewood Mine is owned by TransAlta Utilities Corp. and operated by Manalta Coal Ltd.

MANALTA COAL LIMITED
Whitewood Mine (Mine No. 1757); Wabamun Coalfield
Wabamun, Plains Region, Alberta

Sampling date	12-12-84
Sampling location	Wabamun Generating Station Feed Belt
Product name	Mine Run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2362-85

Ash analysis, per cent:

SiO2	57.05
Al2O3	17.85
Fe2O3	4.37
Mn3O4	-
TiO2	0.67
P2O5	0.13
CaO	10.53
MgO	1.61
SO3	4.37
Na2O	0.34
K2O	0.51
SrO	0.06
BaO	0.38
Loss on fusion (LOF)	0.75

Volatile trace element analysis ug/g (ppm)

Hg	0.09
Cl	70
F	83.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

COAL ANALYSES – ALBERTA (FOOTHILLS AND MOUNTAIN REGIONS)

LUSCAR LIMITED
Coal Valley Mine (Mine No. 1778); Val D'Or Seam; Coalspur Coalfield
Edson, Foothills Region, Alberta
N.E. Qtr. SEC. 4, TWP. 47; R19, W5M

Sampling date	2-11-84
Sampling location	Mine (sfce) Pit 24 (1050 S 550 W) 37800 N 104850 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2341-85

Rank of coal	High-volatile C bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	9.03		
Ash	%	13.96	15.35	
Volatile	%	30.19	33.19	39.21
Fixed carbon	%	46.81	51.46	60.79
Ultimate:				
Carbon	%	60.07	66.03	78.00
Hydrogen	%	3.85	4.23	5.00
Sulphur (Pyritic)	%	(0.12)	(0.13)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.14)	(0.15)	(0.18)
Total	%	0.25	0.28	-
Nitrogen	%	0.93	1.02	1.20
Ash	%	13.96	15.35	-
Oxygen, by difference	%	11.91	13.09	15.46
Heating value:				
	MJ/kg	23.58	25.92	30.62
	kcal/kg	5632	6191	7314
	Btu/lb	10138	11144	13165

Hardgrove grindability index		45
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1168	1196
Spherical	°C	1210	1246
Hemispherical	°C	1307	1282
Fluid	°C	1368	1479

Notes:

LUSCAR LIMITED
Coal Valley Mine (Mine No. 1778); Val D'Or Seam; Coalspur Coalfield
Edson, Foothills Region, Alberta
N.E. Qtr. SEC. 4, TWP. 47; R19, W5M

Sampling date	2-11-84
Sampling location	Mine (sfce) Pit 24 (1050 S 550 W) 37800 N 104850 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2341-85

Ash analysis, per cent:

SiO_2	53.30
Al_2O_3	16.45
Fe_2O_3	4.56
Mn_3O_4	–
TiO_2	0.58
P_2O_5	0.01
CaO	11.11
MgO	1.58
SO_3	2.78
Na_2O	2.27
K_2O	0.57
SrO	0.18
BaO	0.47
Loss on fusion (LOF)	4.25

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1365.5 m

LUSCAR LIMITED
Coal Valley Mine (Mine No. 1778); Silkstone (Wee) Seam; Coalspur Coalfield
Edson, Foothills Region, Alberta
N.W. Qtr. Sec. 9, Twp. 47; R19, W5M

Sampling date	2-11-84
Sampling location	Mine (sfce) Pit 31 E (150 S 400 W) 40500 N 98800 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2342-85

Rank of coal .... High-volatile C bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	9.28		
Ash	%	12.37	13.63	
Volatile	%	29.29	32.29	37.39
Fixed carbon	%	49.06	54.08	62.61
Ultimate:				
Carbon	%	62.04	68.39	79.18
Hydrogen	%	3.76	4.15	4.80
Sulphur (Pyritic)	%	(0.12)	(0.13)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.03)	(0.03)	(0.04)
Total	%	0.15	0.17	–
Nitrogen	%	1.09	1.20	1.39
Ash	%	12.37	13.63	–
Oxygen, by difference	%	11.30	12.46	14.43
Heating value:				
	MJ/kg	24.07	26.53	30.72
	kcal/kg	5749	6337	7337
	Btu/lb	10348	11407	13207

Hardgrove grindability index		62
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1157	1257
Spherical	°C	1285	1329
Hemispherical	°C	1307	1377
Fluid	°C	1379	1482+

Notes:

LUSCAR LIMITED
Coal Valley Mine (Mine No. 1778); Silkstone (Wee) Seam; Coalspur Coalfield
Edson, Foothills Region, Alberta
N.W. Qtr. Sec. 9, Twp. 47; R19, W5M

Sampling date	2-11-84
Sampling location	Mine (sfce) Pit 31 E (150 S 400 W) 40500 N 98800 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2342-85

Ash analysis, per cent:

SiO2	50.61
Al2O3	19.15
Fe2O3	4.41
Mn3O4	-
TiO2	0.50
P2O5	0.04
CaO	14.17
MgO	1.02
SO3	2.01
Na2O	0.14
K2O	0.55
SrO	0.08
BaO	0.34
Loss on fusion (LOF)	5.12

Volatile trace element analysis ug/g (ppm)

Hg	0.02
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1353.3 m

LUSCAR LIMITED
Coal Valley Mine (Mine No. 1778); Mynheer A Seam; Coalspur Coalfield
Edson, Foothills Region, Alberta
N.E. Qtr. Sec. 25, Twp. 47; R20, W5M

Sampling date	2-11-84
Sampling location	Mine (sfce) Pit 12 (1250 S 1150 W) 39450 N 78250 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2344-85

Rank of coal .... High-volatile C bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	8.50		
Ash	%	13.06	14.27	
Volatile	%	29.49	32.23	37.59
Fixed carbon	%	48.95	53.50	62.41
Ultimate:				
Carbon	%	61.43	67.14	78.32
Hydrogen	%	3.90	4.26	4.97
Sulphur (Pyritic)	%	(0.05)	(0.05)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.15)	(0.16)	(0.19)
Total	%	0.20	0.22	-
Nitrogen	%	0.99	1.08	1.26
Ash	%	13.06	14.27	-
Oxygen, by difference	%	11.92	13.03	15.20
Heating value:				
	MJ/kg	24.02	26.25	30.62
	kcal/kg	5737	6270	7314
	Btu/lb	10327	11286	13165

Hardgrove grindability index	52
Free swelling index (FSI)	N/A

Moisture (as rec'd)
Inherent .... %
Adherent .... %

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1177	1224
Spherical	°C	1268	1296
Hemispherical	°C	1349	1360
Fluid	°C	1424	1471

Notes:

LUSCAR LIMITED
Coal Valley Mine (Mine No. 1778); Mynheer A Seam; Coalspur Coalfield
Edson, Foothills Region, Alberta
N.E. Qtr. Sec. 25, Twp. 47; R20, W5M

Sampling date	2-11-84
Sampling location	Mine (sfce) Pit 12 (1250 S 1150 W) 39450 N 78250 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2344-85

Ash analysis, per cent:

SiO_2	52.04
Al_2O_3	18.05
Fe_2O_3	3.94
Mn_3O_4	–
TiO_2	0.68
P_2O_5	0.38
CaO	13.20
MgO	1.71
SO_3	2.63
Na_2O	0.44
K_2O	0.18
SrO	0.08
BaO	0.36
Loss on fusion (LOF)	4.76

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1379.2 m

LUSCAR LIMITED
Coal Valley Mine (Mine No. 1778); Mynheer B Seam; Coalspur Coalfield
Edson, Foothills Region, Alberta
S.E. Qtr. Sec. 16, Twp. 47; R19, W5M

Sampling date	2-11-84
Sampling location	Mine (sfce) Pit 42 (950 S 1100 W) 39450 N 78250 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2339-85

Rank of coal .... High-volatile C bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	9.17		
Ash	%	16.79	18.49	
Volatile	%	27.68	30.47	37.38
Fixed carbon	%	46.36	51.04	62.62
Ultimate:				
Carbon	%	58.20	64.08	78.62
Hydrogen	%	3.72	4.10	5.03
Sulphur (Pyritic)	%	(0.11)	(0.12)	-
(Sulphate)	%	(0.01)	(0.01)	-
(Organic)	%	(0.18)	(0.20)	(0.24)
Total	%	0.30	0.33	-
Nitrogen	%	0.90	0.99	1.21
Ash	%	16.79	18.49	-
Oxygen, by difference	%	10.91	12.01	14.73
Heating value:				
	MJ/kg	22.71	25.00	30.67
	kcal/kg	5424	5971	7326
	Btu/lb	9762	10748	13186

Hardgrove grindability index		45
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1149	1274
Spherical	°C	1293	1332
Hemispherical	°C	1396	1385
Fluid	°C	1421	1482+

Notes:

LUSCAR LIMITED
Coal Valley Mine (Mine No. 1778); Mynheer B Seam; Coalspur Coalfield
Edson, Foothills Region, Alberta
S.E. Qtr. Sec. 16, Twp. 47; R19, W5M

Sampling date	2-11-84
Sampling location	Mine (sfce) Pit 42 (950 S 1100 W) 39450 N 78250 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2339-85

Ash analysis, per cent:

SiO_2	51.43
Al_2O_3	20.26
Fe_2O_3	3.16
Mn_3O_4	-
TiO_2	0.73
P_2O_5	0.07
CaO	11.46
MgO	1.16
SO_3	2.49
Na_2O	1.20
K_2O	0.36
SrO	0.06
BaO	0.27
Loss on fusion (LOF)	4.97

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1348.7 m

LUSCAR LIMITED
Coal Valley Mine (Mine No. 1778); Coalspur Coalfield
Edson, Foothills Region, Alberta

Sampling date	2-11-84
Sampling location	Preparation Plant Feed Belt
Product name	Raw Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2343-85

Rank of coal .... High-volatile C bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	10.16		
Ash	%	25.74	28.65	
Volatile	%	25.69	28.59	40.07
Fixed carbon	%	38.42	42.76	59.93
Ultimate:				
Carbon	%	49.94	55.59	77.91
Hydrogen	%	3.21	3.57	5.00
Sulphur (Pyritic)	%	(0.11)	(0.12)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.09)	(0.10)	(0.14)
Total	%	0.20	0.22	–
Nitrogen	%	0.95	1.06	1.49
Ash	%	25.74	28.65	–
Oxygen, by difference	%	9.80	10.91	15.29
Heating value:				
	MJ/kg	19.32	21.51	30.14
	kcal/kg	4615	5137	7199
	Btu/lb	8307	9246	12959

Hardgrove grindability index	56
Free swelling index (FSI)	N/A
Moisture (as rec'd)	
Inherent %	
Adherent %	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1243	1293
Spherical	°C	1313	1360
Hemispherical	°C	1410	1418
Fluid	°C	1446	1482+

Notes:

LUSCAR LIMITED
Coal Valley Mine (Mine No. 1778): Coalspur Coalfield
Edson, Foothills Region, Alberta

Sampling date	2-11-84
Sampling location	Preparation Plant Feed Belt
Product name	Raw Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2343-85

Ash analysis, per cent:

SiO_2	60.16
Al_2O_3	20.11
Fe_2O_3	2.94
Mn_3O_4	-
TiO_2	0.70
P_2O_5	0.18
CaO	7.33
MgO	1.20
SO_3	1.01
Na_2O	0.92
K_2O	0.60
SrO	0.06
BaO	0.26
Loss on fusion (LOF)	3.12

Volatile trace element analysis ug/g (ppm)

Hg	0.08
Cl	60
F	211.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

LUSCAR LIMITED
Coal Valley Mine (Mine No. 1778); Coalspur Coalfield
Edson, Foothills Region, Alberta

Sampling date	2-11-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2340-85

Rank of coal .... High-volatile C bituminous

Proximate analysis:	As Rec'd	Dry	Dry Ash Free
Equilibrium moisture .... %	9.23		
Ash .... %	10.28	11.32	
Volatile .... %	30.04	33.09	37.31
Fixed carbon .... %	50.46	55.59	62.69
Ultimate:			
Carbon .... %	63.58	70.05	78.99
Hydrogen .... %	4.07	4.48	5.05
Sulphur (Pyritic) .... %	(0.09)	(0.10)	-
(Sulphate) .... %	(0.00)	(0.00)	-
(Organic) .... %	(0.17)	(0.18)	(0.21)
Total .... %	0.25	0.28	-
Nitrogen .... %	1.00	1.10	1.24
Ash .... %	10.28	11.32	-
Oxygen, by difference ...... %	11.59	12.77	14.40
Heating value:			
MJ/kg	25.22	27.78	31.33
kcal/kg	6023	6636	7483
Btu/lb	10842	11944	13469

Hardgrove grindability index	44
Free swelling index (FSI)	N/A
Moisture (as rec'd)	
Inherent .... %	
Adherent .... %	

Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1229	1254
Spherical .... °C	1282	1327
Hemispherical .... °C	1393	1366
Fluid .... °C	1441	1479

Notes:

LUSCAR LIMITED
Coal Valley Mine (Mine No. 1778); Coalspur Coalfield
Edson, Foothills Region, Alberta

Sampling date	2-11-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2340-85

Ash analysis, per cent:

SiO2	58.28
Al2O3	18.73
Fe2O3	3.92
Mn3O4	—
TiO2	0.86
P2O5	0.37
CaO	6.63
MgO	1.51
SO3	3.24
Na2O	1.28
K2O	0.25
SrO	0.11
BaO	0.27
Loss on fusion (LOF)	2.87

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	—
F	—
Br	—
As	—
Se	—

Non-volatile trace element analysis ug/g (ppm)

Ba
Sr
V
Mn
Cr

Notes:

CARDINAL RIVER COALS LTD.
Luscar Mine (Mine No. 1768);Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta
Sec. 13, Twp. 47; R24, W5M

Sampling date	5-11-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2345-85

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.45		
Ash	%	15.81	16.04	
Volatile	%	20.90	21.21	25.26
Fixed carbon	%	61.84	62.75	74.74
Ultimate:				
Carbon	%	74.63	75.72	90.19
Hydrogen	%	4.09	4.15	4.94
Sulphur (Pyritic)	%	(0.04)	(0.04)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.11)	(0.11)	(0.13)
Total	%	0.15	0.15	–
Nitrogen	%	1.15	1.17	1.39
Ash	%	15.81	16.04	–
Oxygen, by difference	%	2.73	2.77	3.30
Heating value:				
	MJ/kg	29.72	30.15	35.92
	kcal/kg	7098	7202	8578
	Btu/lb	12777	12964	15441

Hardgrove grindability index		78
Free swelling index (FSI)		4.0
Moisture (as rec'd)		
Inherent	%	1.02
Adherent	%	0.43

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1338	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Luscar Mine is owned by Luscar Ltd. and operated by Cardinal River Coals Ltd.

CARDINAL RIVER COALS LTD.

Luscar Mine (Mine No. 1768);Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta
Sec. 13, Twp. 47; R24, W5M

Sampling date	5-11-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2345-85

Ash analysis, per cent:

SiO_2	53.83
Al_2O_3	27.50
Fe_2O_3	3.22
Mn_3O_4	-
TiO_2	1.02
P_2O_5	0.27
CaO	4.14
MgO	1.11
SO_3	1.93
Na_2O	1.36
K_2O	0.54
SrO	0.15
BaO	0.43
Loss on fusion (LOF)	2.30

Volatile trace element analysis ug/g (ppm)

Hg	0.08
Cl	90
F	78.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1524 m

CARDINAL RIVER COALS LTD.
Luscar Mine (Mine No. 1768);Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Preparation Plant Stockpile
Product name	Raw Coal (oxidized)
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2347-85

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	4.37		
Ash	%	18.03	18.86	
Volatile	%	18.95	19.82	24.43
Fixed carbon	%	58.64	61.32	75.57
Ultimate:				
Carbon	%	69.83	73.02	89.99
Hydrogen	%	3.81	3.98	4.91
Sulphur (Pyritic)	%	(0.13)	(0.13)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.22)	(0.23)	(0.29)
Total	%	0.36	0.38	–
Nitrogen	%	1.26	1.32	1.63
Ash	%	18.03	18.86	–
Oxygen, by difference	%	2.33	2.44	3.01
Heating value:				
	MJ/kg	27.88	29.15	35.93
	kcal/kg	6659	6963	8582
	Btu/lb	11986	12534	15447

Hardgrove grindability index		92
Free swelling index (FSI)		3.0
Moisture (as rec'd)		
Inherent	%	1.01
Adherent	%	3.36

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1246	1310
Spherical	°C	1360	1441
Hemispherical	°C	1460	1479
Fluid	°C	1482+	1482+

Notes: Luscar Mine is owned by Luscar Ltd. and operated by Cardinal River Coals Ltd.

CARDINAL RIVER COALS LTD.
Luscar Mine (Mine No. 1768);Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Preparation Plant Stockpile
Product name	Raw Coal (oxidized)
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2347-85

Ash analysis, per cent:

SiO2	58.51
Al2O3	21.46
Fe2O3	4.17
Mn3O4	-
TiO2	1.02
P2O5	0.38
CaO	4.10
MgO	0.95
SO3	2.67
Na2O	1.39
K2O	0.64
SrO	0.08
BaO	0.47
Loss on fusion (LOF)	1.87

Volatile trace element analysis ug/g (ppm)

Hg	0.28
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CARDINAL RIVER COALS LTD.
Luscar Mine (Mine No. 1768);Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Preparation Plant Feed Belt
Product name	Raw Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2348-85

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	1.25		
Ash	%	18.22	18.45	
Volatile	%	21.40	21.67	26.57
Fixed carbon	%	59.13	59.88	73.43
Ultimate:				
Carbon	%	71.67	72.57	88.99
Hydrogen	%	3.93	3.98	4.88
Sulphur (Pyritic)	%	(0.06)	(0.06)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.10)	(0.10)	(0.12)
Total	%	0.16	0.16	-
Nitrogen	%	1.21	1.23	1.51
Ash	%	18.22	18.45	-
Oxygen, by difference	%	3.56	3.61	4.43
Heating value:				
	MJ/kg	28.51	28.87	35.40
	kcal/kg	6809	6895	8455
	Btu/lb	12256	12411	15219

Hardgrove grindability index		80
Free swelling index (FSI)		4.5
Moisture (as rec'd)		
Inherent	%	0.87
Adherent	%	0.38

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1277	1304
Spherical	°C	1313	1354
Hemispherical	°C	1332	1382
Fluid	°C	1410	1482+

Notes: Luscar Mine is owned by Luscar Ltd. and operated by Cardinal River Coals Ltd.

CARDINAL RIVER COALS LTD.
Luscar Mine (Mine No. 1768);Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Preparation Plant Feed Belt
Product name	Raw Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2348-85

Ash analysis, per cent:

SiO2	52.80
Al2O3	24.51
Fe2O3	3.84
Mn3O4	–
TiO2	0.96
P2O5	0.33
CaO	8.20
MgO	1.89
SO3	1.87
Na2O	1.05
K2O	0.79
SrO	0.20
BaO	0.45
Loss on fusion (LOF)	1.32

Volatile trace element analysis ug/g (ppm)

Hg	0.12
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CARDINAL RIVER COALS LTD.
Luscar Mine (Mine No. 1768);Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Preparation Plant Sampled from stockpile
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2346-85

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	7.22		
Ash	%	9.07	9.78	
Volatile	%	20.48	22.07	24.46
Fixed carbon	%	63.23	68.15	75.54
Ultimate:				
Carbon	%	75.79	81.69	90.55
Hydrogen	%	4.06	4.38	4.85
Sulphur (Pyritic)	%	(0.03)	(0.03)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.16)	(0.17)	(0.19)
Total	%	0.19	0.20	–
Nitrogen	%	1.29	1.39	1.54
Ash	%	9.07	9.78	–
Oxygen, by difference	%	2.38	2.56	2.84
Heating value:				
	MJ/kg	30.29	32.65	36.19
	kcal/kg	7235	7798	8643
	Btu/lb	13022	14036	15558

Hardgrove grindability index		80
Free swelling index (FSI)		6.5
Moisture (as rec'd)		
Inherent	%	0.87
Adherent	%	6.35

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1207	1313
Spherical	°C	1316	1360
Hemispherical	°C	1379	1379
Fluid	°C	1421	1482+

Notes: Luscar Mine is owned by Luscar Ltd. and operated by Cardinal River Coals Ltd.

CARDINAL RIVER COALS LTD.
Luscar Mine (Mine No. 1768);Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Preparation Plant Sampled from stockpile
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2346-85

Ash analysis, per cent:

SiO2	48.48
Al2O3	24.77
Fe2O3	4.13
Mn3O4	-
TiO2	1.20
P2O5	0.67
CaO	7.68
MgO	1.76
SO3	3.39
Na2O	1.47
K2O	0.31
SrO	0.23
BaO	0.46
Loss on fusion (LOF)	3.20

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

GREGG RIVER RESOURCES LTD.

Gregg River Mine ;Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta
LSD. 10, Sec. 28, Twp. 47; R24, W5

Sampling date	4-12-84
Sampling location	Mine (surface) CD 1 Pit
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2349-85

Rank of coal .... Low-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	1.20		
Ash	%	15.04	15.22	
Volatile	%	19.17	19.40	22.88
Fixed carbon	%	64.60	65.38	77.12
Ultimate:				
Carbon	%	75.58	76.50	90.23
Hydrogen	%	4.00	4.05	4.78
Sulphur (Pyritic)	%	(0.08)	(0.08)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.23)	(0.23)	(0.27)
Total	%	0.31	0.31	–
Nitrogen	%	1.31	1.33	1.57
Ash	%	15.04	15.22	–
Oxygen, by difference	%	2.56	2.59	3.05
Heating value:				
	MJ/kg	30.22	30.59	36.08
	kcal/kg	7218	7306	8617
	Btu/lb	12993	13150	15511

Hardgrove grindability index		91
Free swelling index (FSI)		3.5
Moisture (as rec'd)		
Inherent	%	0.80
Adherent	%	0.40

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1152	1446
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Greg River Mine is owned by Manalta Coal Ltd. and operated by Gregg River Resources Ltd.

GREGG RIVER RESOURCES LTD.
Gregg River Mine ;Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta
LSD. 10, Sec. 28, Twp. 47; R24, W5

Sampling date	4-12-84
Sampling location	Mine (surface) CD 1 Pit
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2349-85

Ash analysis, per cent:

SiO2	60.29
Al2O3	24.77
Fe2O3	4.23
Mn3O4	—
TiO2	1.12
P2O5	0.33
CaO	2.47
MgO	0.76
SO3	0.91
Na2O	1.29
K2O	0.80
SrO	0.07
BaO	0.48
Loss on fusion (LOF)	0.38

Volatile trace element analysis ug/g (ppm)

Hg	0.09
Cl	—
F	—
Br	—
As	—
Se	—

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1635 m

GREGG RIVER RESOURCES LTD.
Gregg River Mine ;Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta
LSD. 6, Sec. 21, Twp. 47; R24, W5

Sampling date	4-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2350-85

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	2.08		
Ash	%	10.42	10.64	
Volatile	%	23.21	23.70	26.52
Fixed carbon	%	64.29	65.66	73.48
Ultimate:				
Carbon	%	78.32	79.98	89.50
Hydrogen	%	4.37	4.46	4.99
Sulphur (Pyritic)	%	(0.03)	(0.03)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.16)	(0.16)	(0.18)
Total	%	0.19	0.19	–
Nitrogen	%	1.31	1.34	1.50
Ash	%	10.42	10.64	–
Oxygen, by difference	%	3.32	3.39	3.79
Heating value:				
	MJ/kg	31.51	32.18	36.01
	kcal/kg	7527	7687	8602
	Btu/lb	13548	13836	15483

Hardgrove grindability index		89
Free swelling index (FSI)		7.5
Moisture (as rec'd)		
Inherent	%	0.92
Adherent	%	1.16

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1146	1271
Spherical	°C	1246	1316
Hemispherical	°C	1271	1338
Fluid	°C	1374	1460

Notes: Greg River Mine is owned by Manalta Coal Ltd. and operated by Gregg River Resources Ltd.

GREGG RIVER RESOURCES LTD.
Gregg River Mine ;Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta
LSD. 6, Sec. 21, Twp. 47; R24, W5

Sampling date	4-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2350-85

Ash analysis, per cent:

SiO_2	50.27
Al_2O_3	20.20
Fe_2O_3	4.96
Mn_3O_4	-
TiO_2	1.41
P_2O_5	1.42
CaO	10.50
MgO	1.97
SO_3	3.63
Na_2O	1.38
K_2O	0.17
SrO	0.18
BaO	0.71
Loss on fusion (LOF)	1.99

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1650 m

GREGG RIVER RESOURCES LTD.

Gregg River Mine ;Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta

Sampling date	4-12-85
Sampling location	Preparation Plant Sampled From Stockpile
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2351-85

Rank of coal	Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	5.90		
Ash	%	9.36	9.95	
Volatile	%	19.89	21.14	23.48
Fixed carbon	%	64.84	68.91	76.52
Ultimate:				
Carbon	%	76.75	81.56	90.57
Hydrogen	%	4.13	4.39	4.88
Sulphur (Pyritic)	%	(0.06)	(0.06)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.23)	(0.24)	(0.27)
Total	%	0.29	0.31	–
Nitrogen	%	1.31	1.39	1.54
Ash	%	9.36	9.95	–
Oxygen, by difference	%	2.26	2.40	2.67
Heating value:				
	MJ/kg	30.78	32.71	36.33
	kcal/kg	7352	7813	8677
	Btu/lb	13234	14064	15618

Hardgrove grindability index		85
Free swelling index (FSI)		5.0
Moisture (as rec'd)		
Inherent	%	0.94
Adherent	%	4.96

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1310	1404
Spherical	°C	1460	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Greg River Mine is owned by Manalta Coal Ltd. and operated by Gregg River Resources Ltd.

GREGG RIVER RESOURCES LTD.
Gregg River Mine ;Jewel Seam; Cadomin-Luscar Coalfield
Hinton, Mountain Region, Alberta

Sampling date	4-12-85
Sampling location	Preparation Plant Sampled From Stockpile
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2351-85

Ash analysis, per cent:

SiO_2	54.71
Al_2O_3	25.32
Fe_2O_3	4.55
Mn_3O_4	–
TiO_2	1.31
P_2O_5	0.57
CaO	4.34
MgO	1.14
SO_3	2.75
Na_2O	1.30
K_2O	0.43
SrO	0.13
BaO	0.70
Loss on fusion (LOF)	1.19

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	100
F	84.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

SMOKY RIVER COAL LTD.
No. 9 Mine (Mine No. 1774); No. 4 Seam; Smoky River Coalfield
Grand Cache, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Mine (Surface) 44181.4 N 93912 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2335-85

Rank of coal .... Low-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	1.29		
Ash	%	19.83	20.09	
Volatile	%	16.27	16.48	20.62
Fixed carbon	%	62.61	63.43	79.38
Ultimate:				
Carbon	%	71.76	72.70	90.98
Hydrogen	%	3.69	3.74	4.68
Sulphur (Pyritic)	%	(0.30)	(0.30)	-
(Sulphate)	%	(0.02)	(0.02)	-
(Organic)	%	(0.25)	(0.25)	(0.32)
Total	%	0.57	0.58	-
Nitrogen	%	1.32	1.34	1.68
Ash	%	19.83	20.09	-
Oxygen, by difference	%	1.53	1.55	1.94
Heating value:				
	MJ/kg	28.45	28.82	36.07
	kcal/kg	6795	6884	8615
	Btu/lb	12232	12391	15506

Hardgrove grindability index		111
Free swelling index (FSI)		3.0
Moisture (as rec'd)		
Inherent	%	0.89
Adherent	%	0.40

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1291	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Smoky River Coal Ltd. is a subsidiary of McIntyre Mines Ltd.

SMOKY RIVER COAL LTD.
No. 9 Mine (Mine No. 1774); No. 4 Seam; Smoky River Coalfield
Grand Cache, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Mine (Surface) 44181.4 N 93912 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2335-85

Ash analysis, per cent:

SiO2	57.22
Al2O3	24.89
Fe2O3	4.58
Mn3O4	–
TiO2	1.08
P2O5	0.37
CaO	2.42
MgO	0.76
SO3	2.09
Na2O	0.76
K2O	1.87
SrO	0.09
BaO	0.31
Loss on fusion (LOF)	1.63

Volatile trace element analysis ug/g (ppm)

Hg	0.16
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1413 m

SMOKY RIVER COAL LTD.
No. 9 Mine (Mine No. 1774); No. 4 Seam; Smoky River Coalfield
Grand Cache, Mountain Region, Alberta

Sampling date	1-11-84
Sampling location	Upper E Mine (Surface) 51950 N 100950 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2334-85

Rank of coal .... Low-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.62		
Ash	%	24.55	24.96	
Volatile	%	15.19	15.44	20.58
Fixed carbon	%	58.63	59.60	79.42
Ultimate:				
Carbon	%	67.06	68.17	90.84
Hydrogen	%	3.51	3.57	4.76
Sulphur (Pyritic)	%	(0.28)	(0.28)	–
(Sulphate)	%	(0.02)	(0.02)	–
(Organic)	%	(0.26)	(0.26)	(0.35)
Total	%	0.56	0.57	–
Nitrogen	%	1.22	1.24	1.65
Ash	%	24.55	24.96	–
Oxygen, by difference	%	1.47	1.49	1.99
Heating value:				
	MJ/kg	26.48	26.92	35.87
	kcal/kg	6325	6429	8567
	Btu/lb	11384	11572	15421

Hardgrove grindability index		93
Free swelling index (FSI)		2.5
Moisture (as rec'd)		
Inherent	%	0.98
Adherent	%	0.64

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1366	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Smoky River Coal Ltd. is a subsidiary of McIntyre Mines Ltd.

SMOKY RIVER COAL LTD.
No. 9 Mine (Mine No. 1774); No. 4 Seam; Smoky River Coalfield
Grand Cache, Mountain Region, Alberta

Sampling date	1-11-84
Sampling location	Upper E Mine (Surface) 51950 N 100950 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2334-85

Ash analysis, per cent:

SiO_2	63.00
Al_2O_3	25.18
Fe_2O_3	2.37
Mn_3O_4	–
TiO_2	1.02
P_2O_5	0.28
CaO	1.16
MgO	0.64
SO_3	0.53
Na_2O	0.65
K_2O	2.30
SrO	0.07
BaO	0.31
Loss on fusion (LOF)	1.18

Volatile trace element analysis ug/g (ppm)

Hg	0.15
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1376.2 m

SMOKY RIVER COAL LTD.
No. 9 Mine (Mine No. 1774); No. 10 Seam; Smoky River Coalfield
Grand Cache, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Mine W Extension (Surface) 52125.8 N 99639.2 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2336-85

Rank of coal .... Low-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	0.84		
Ash	%	20.52	20.69	
Volatile	%	17.89	18.04	22.75
Fixed carbon	%	60.76	61.27	77.25
Ultimate:				
Carbon	%	70.98	71.58	90.25
Hydrogen	%	3.77	3.80	4.79
Sulphur (Pyritic)	%	(0.07)	(0.07)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.25)	(0.25)	(0.32)
Total	%	0.32	0.32	-
Nitrogen	%	1.16	1.17	1.48
Ash	%	20.52	20.69	-
Oxygen, by difference	%	2.42	2.44	3.08
Heating value:				
	MJ/kg	28.10	28.34	35.73
	kcal/kg	6712	6769	8535
	Btu/lb	12082	12184	15363

Hardgrove grindability index		88
Free swelling index (FSI)		4.5
Moisture (as rec'd)		
Inherent	%	0.84
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Smoky River Coal Ltd. is a subsidiary of McIntyre Mines Ltd.

SMOKY RIVER COAL LTD.
No. 9 Mine (Mine No. 1774); No. 10 Seam; Smoky River Coalfield
Grand Cache, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Mine W Extension (Surface) 52125.8 N 99639.2 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2336-85

Ash analysis, per cent:

SiO_2	56.87
Al_2O_3	26.94
Fe_2O_3	5.56
Mn_3O_4	–
TiO_2	1.42
P_2O_5	0.45
CaO	1.94
MgO	0.69
SO_3	1.07
Na_2O	0.77
K_2O	0.51
SrO	0.07
BaO	0.21
Loss on fusion (LOF)	1.22

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1418.5 m

SMOKY RIVER COAL LTD.
Mine No. 1765/09/B; No. 4 Seam (SW Section); Smoky River Coalfield
Grand Cache, Mountain Region, Alberta

Sampling date	1-11-84
Sampling location	Mine (u/g) 50290 N 89600 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2333-85

Rank of coal		Low-volatile bituminous		
Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.21		
Ash	%	7.85	7.95	
Volatile	%	17.00	17.21	18.70
Fixed carbon	%	73.94	74.84	81.30
Ultimate:				
Carbon	%	83.48	84.50	91.80
Hydrogen	%	4.20	4.25	4.62
Sulphur (Pyritic)	%	(0.03)	(0.03)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.28)	(0.28)	(0.31)
Total	%	0.31	0.31	-
Nitrogen	%	1.34	1.36	1.48
Ash	%	7.85	7.95	-
Oxygen, by difference	%	1.61	1.63	1.77
Heating value:				
	MJ/kg	33.10	33.51	36.40
	kcal/kg	7906	8003	8694
	Btu/lb	14231	14405	15649

Hardgrove grindability index		106	
Free swelling index (FSI)		4.0	
Moisture (as rec'd)			
Inherent	%	0.85	
Adherent	%	0.36	
Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1385	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Smoky River Coal Ltd. is a subsidiary of McIntyre Mines Ltd.

SMOKY RIVER COAL LTD.
Mine No. 1765/09/B; No. 4 Seam (SW Section); Smoky River Coalfield
Grand Cache, Mountain Region, Alberta

Sampling date	1-11-84
Sampling location	Mine (u/g) 50290 N 89600 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2333-85

Ash analysis, per cent:

SiO2	52.02
Al2O3	29.35
Fe2O3	1.88
Mn3O4	-
TiO2	1.37
P2O5	0.87
CaO	5.28
MgO	-
SO3	3.18
Na2O	1.32
K2O	0.33
SrO	0.17
BaO	0.58
Loss on fusion (LOF)	2.05

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

SMOKY RIVER COAL LTD.
Underground & Surface Mines; Various Seams; Smoky River Coalfield
Grand Cache, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Preparation Plant
Product name	Raw Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2337-85

Rank of coal .... Low-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	2.15		
Ash	%	19.41	19.84	
Volatile	%	16.26	16.62	20.73
Fixed carbon	%	62.17	63.54	79.27
Ultimate:				
Carbon	%	71.61	73.18	91.29
Hydrogen	%	3.68	3.76	4.69
Sulphur (Pyritic)	%	(0.20)	(0.20)	–
(Sulphate)	%	(0.02)	(0.02)	–
(Organic)	%	(0.24)	(0.24)	(0.30)
Total	%	0.45	0.46	–
Nitrogen	%	1.22	1.25	1.56
Ash	%	19.41	19.84	–
Oxygen, by differance	%	1.48	1.51	1.88
Heating value:				
	MJ/kg	28.13	28.75	35.86
	kcal/kg	6719	6867	8566
	Btu/lb	12094	12360	15419

Hardgrove grindability index		96
Free swelling index (FSI)		2.5
Moisture (as rec'd)		
Inherent	%	0.87
Adherent	%	1.28

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1224	1277
Spherical	°C	1307	1388
Hemispherical	°C	1429	1463
Fluid	°C	1482+	1482+

Notes: Smoky River Coal Ltd. is a subsidiary of McIntyre Mines Ltd.

SMOKY RIVER COAL LTD.
Underground & Surface Mines; Various Seams; Smoky River Coalfield
Grand Cache, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Preparation Plant
Product name	Raw Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2337-85

Ash analysis, per cent:

SiO_2	56.67
Al_2O_3	22.54
Fe_2O_3	3.19
Mn_3O_4	-
TiO_2	1.12
P_2O_5	0.45
CaO	5.42
MgO	1.63
SO_3	3.66
Na_2O	0.70
K_2O	2.02
SrO	0.10
BaO	0.07
Loss on fusion (LOF)	1.90

Volatile trace element analysis ug/g (ppm)

Hg	0.19
Cl	150
F	109.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

SMOKY RIVER COAL LTD.
Underground & Surface Mines; Various Seams; Smoky River Coalfield
Grand Cache, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2338-85

Rank of coal .... Low-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	3.03		
Ash	%	6.90	7.12	
Volatile	%	16.93	17.46	18.80
Fixed carbon	%	73.13	75.42	81.20
Ultimate:				
Carbon	%	82.40	84.98	91.49
Hydrogen	%	4.15	4.28	4.61
Sulphur (Pyritic)	%	(0.10)	(0.10)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.34)	(0.35)	(0.38)
Total	%	0.44	0.45	–
Nitrogen	%	1.40	1.44	1.55
Ash	%	6.90	7.12	–
Oxygen, by difference	%	1.68	1.73	1.86
Heating value:				
	MJ/kg	32.80	33.83	36.42
	kcal/kg	7835	8080	8699
	Btu/lb	14103	14544	15659

Hardgrove grindability index		94
Free swelling index (FSI)		4.5
Moisture (as rec'd)		
Inherent	%	0.71
Adherent	%	2.32

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1327	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Smoky River Coal Ltd. is a subsidiary of McIntyre Mines Ltd.

SMOKY RIVER COAL LTD.
Underground & Surface Mines; Various Seams; Smoky River Coalfield
Grand Cache, Mountain Region, Alberta

Sampling date	5-11-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2338-85

Ash analysis, per cent:

SiO_2	53.31
Al_2O_3	28.08
Fe_2O_3	3.10
Mn_3O_4	—
TiO_2	1.58
P_2O_5	1.15
CaO	3.99
MgO	0.49
SO_3	2.19
Na_2O	1.32
K_2O	0.58
SrO	0.27
BaO	0.57
Loss on fusion (LOF)	2.72

Volatile trace element analysis ug/g (ppm)

Hg	0.17
Cl	—
F	—
Br	—
As	—
Se	—

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

OBED MOUNTAIN COAL CO.
Obed-Marsh Project; No. 1 Seam; Obed Marsh Coalfield
Hinton, Foothills Region, Alberta
LSD. 18, Sec. 27, Twp. 53; R24, W5M

Sampling date	5-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2352-85

Rank of coal	Subbituminous A

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	13.61		
Ash	%	17.48	20.23	
Volatile	%	33.63	38.93	48.80
Fixed carbon	%	35.28	40.84	51.20
Ultimate:				
Carbon	%	52.69	60.99	76.46
Hydrogen	%	3.65	4.23	5.30
Sulphur (Pyritic)	%	(0.11)	(0.13)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.18)	(0.20)	(0.26)
Total	%	0.29	0.33	–
Nitrogen	%	1.24	1.43	1.79
Ash	%	17.48	20.23	–
Oxygen, by difference	%	11.05	12.79	16.03
Heating value:				
	MJ/kg	20.87	24.16	30.28
	kcal/kg	4985	5770	7233
	Btu/lb	8972	10386	13020

Hardgrove grindability index		44
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1268	1277
Spherical	°C	1318	1416
Hemispherical	°C	1463	1441
Fluid	°C	1482+	1482+

Notes: Obed Mountain Coal Co. is owned by Union Oil Co. of Canada Ltd.

OBED MOUNTAIN COAL CO.
Obed-Marsh Project; No. 1 Seam; Obed Marsh Coalfield
Hinton, Foothills Region, Alberta
LSD. 18, Sec. 27, Twp. 53; R24, W5M

Sampling date	5-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2352-85

Ash analysis, per cent:

SiO2	66.02
Al2O3	16.24
Fe2O3	2.40
Mn3O4	–
TiO2	0.46
P2O5	0.06
CaO	5.36
MgO	1.53
SO3	1.70
Na2O	0.31
K2O	0.35
SrO	0.11
BaO	0.40
Loss on fusion (LOF)	2.71

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

OBED MOUNTAIN COAL CO.
Obed-Marsh Project; No. 2 Seam; Obed Marsh Coalfield
Hinton, Foothills Region, Alberta
LSD. 18, Sec. 27, Twp. 53; R24, W5M

Sampling date	5-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2353-85
Rank of coal	Subbituminous A

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	12.66		
Ash	%	16.94	19.40	
Volatile	%	36.48	41.77	51.82
Fixed carbon	%	33.91	38.83	48.18
Ultimate:				
Carbon	%	53.55	61.31	76.07
Hydrogen	%	3.84	4.40	5.46
Sulphur (Pyritic)	%	(0.30)	(0.35)	-
(Sulphate)	%	(0.08)	(0.09)	-
(Organic)	%	(0.41)	(0.47)	(0.59)
Total	%	0.79	0.91	-
Nitrogen	%	1.29	1.48	1.84
Ash	%	16.94	19.40	-
Oxygen, by difference	%	10.92	12.50	15.51
Heating value:				
	MJ/kg	21.43	24.54	30.45
	kcal/kg	5120	5862	7273
	Btu/lb	9215	10551	13091

Hardgrove grindability index		42
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1218	1263
Spherical	°C	1271	1349
Hemispherical	°C	1421	1441
Fluid	°C	1482+	1482+

Notes: Obed Mountain Coal Co. is owned by Union Oil Co. of Canada Ltd.

OBED MOUNTAIN COAL CO.
Obed-Marsh Project; No. 2 Seam; Obed Marsh Coalfield
Hinton, Foothills Region, Alberta
LSD. 18, Sec. 27, Twp. 53; R24, W5M

Sampling date	5-12-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2353-85

Ash analysis, per cent:

SiO_2	59.15
Al_2O_3	17.55
Fe_2O_3	4.90
Mn_3O_4	–
TiO_2	0.88
P_2O_5	0.33
CaO	6.00
MgO	1.75
SO_3	3.56
Na_2O	0.25
K_2O	0.36
SrO	0.11
BaO	0.56
Loss on fusion (LOF)	2.77

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

OBED MOUNTAIN COAL CO.
Obed-Marsh Project; No. 1 & 2 Seams; Obed Marsh Coalfield
Hinton, Foothills Region, Alberta

Sampling date	5-12-84
Sampling location	Preparation Plant Sampled from stockpile
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2355-85

Rank of coal		Subbituminous A

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	14.70		
Ash	%	15.71	18.42	
Volatile	%	36.93	43.30	53.08
Fixed carbon	%	32.65	38.28	46.92
Ultimate:				
Carbon	%	52.89	62.00	76.00
Hydrogen	%	3.69	4.33	5.31
Sulphur (Pyritic)	%	(0.11)	(0.13)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.17)	(0.20)	(0.24)
Total	%	0.28	0.33	-
Nitrogen	%	1.31	1.53	1.88
Ash	%	15.71	18.42	-
Oxygen, by difference	%	11.42	13.39	16.41
Heating value:				
	MJ/kg	21.00	24.62	30.18
	kcal/kg	5016	5880	7208
	Btu/lb	9028	10584	12974

Hardgrove grindability index		42
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1257	1279
Spherical	°C	1307	1343
Hemispherical	°C	1341	1449
Fluid	°C	1482+	1482+

Notes: Obed Mountain Coal Co. is owned by Union Oil Co. of Canada Ltd.

OBED MOUNTAIN COAL CO.

Obed-Marsh Project; No. 1 & 2 Seams; Obed Marsh Coalfield
Hinton, Foothills Region, Alberta

Sampling date	5-12-84
Sampling location	Preparation Plant Sampled from stockpile
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2355-85

Ash analysis, per cent:

SiO_2	63.12
Al_2O_3	18.49
Fe_2O_3	2.46
Mn_3O_4	-
TiO_2	0.63
P_2O_5	0.06
CaO	6.22
MgO	1.65
SO_3	2.48
Na_2O	0.27
K_2O	0.41
SrO	0.08
BaO	0.48
Loss on fusion (LOF)	2.26

Volatile trace element analysis ug/g (ppm)

Hg	0.10
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

OBED MOUNTAIN COAL CO.

Obed-Marsh Project; No. 1 & 2 Seams; Obed Marsh Coalfield
Hinton, Foothills Region, Alberta

Sampling date	5-12-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2354-85
Rank of coal	Subbituminous A

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	12.28		
Ash	%	10.85	12.37	
Volatile	%	37.75	43.03	49.10
Fixed carbon	%	39.12	44.60	50.90
Ultimate:				
Carbon	%	59.20	67.49	77.02
Hydrogen	%	4.14	4.72	5.39
Sulphur (Pyritic)	%	(0.10)	(0.11)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.26)	(0.29)	(0.33)
Total	%	0.36	0.41	–
Nitrogen	%	1.45	1.65	1.88
Ash	%	10.85	12.37	–
Oxygen, by difference	%	11.72	13.36	15.25
Heating value:				
	MJ/kg	23.58	26.88	30.68
	kcal/kg	5633	6421	7328
	Btu/lb	10139	11558	13190

Hardgrove grindability index	41
Free swelling index (FSI)	N/A
Moisture (as rec'd)	
Inherent .... %	
Adherent .... %	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1277	1293
Spherical	°C	1313	1360
Hemispherical	°C	1396	1471
Fluid	°C	1474	1482+

Notes: Obed Mountain Coal Co. is owned by Union Oil Co. of Canada Ltd.

OBED MOUNTAIN COAL CO.
Obed-Marsh Project; No. 1 & 2 Seams; Obed Marsh Coalfield
Hinton, Foothills Region, Alberta

Sampling date	5-12-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2354-85

Ash analysis, per cent:

SiO_2	60.51
Al_2O_3	18.31
Fe_2O_3	2.75
Mn_3O_4	-
TiO_2	0.74
P_2O_5	0.16
CaO	6.73
MgO	0.90
SO_3	3.72
Na_2O	0.29
K_2O	0.44
SrO	0.16
BaO	0.69
Loss on fusion (LOF)	2.25

Volatile trace element analysis ug/g (ppm)

Hg	0.03
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

COAL ANALYSES – BRITISH COLUMBIA

BYRON CREEK COLLIERIES LIMITED
Coal Mountain Mine; No. 1 Seam (Top Section); Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	17-08-84
Sampling location	Mine (surface) 3517 N 5730 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3937-84

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	2.12		
Ash	%	22.28	22.76	
Volatile	%	22.04	22.52	29.16
Fixed carbon	%	53.56	54.72	70.84
Ultimate:				
Carbon	%	64.17	65.56	84.88
Hydrogen	%	3.61	3.69	4.78
Sulphur (Pyritic)	%	(0.03)	(0.03)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.15)	(0.15)	(0.20)
Total	%	0.18	0.18	-
Nitrogen	%	1.10	1.12	1.45
Ash	%	22.28	22.76	-
Oxygen, by difference	%	6.55	6.69	8.66
Heating value:				
	MJ/kg	25.59	26.15	33.85
	kcal/kg	6113	6246	8086
	Btu/lb	11004	11242	14555

Hardgrove grindability index		94
Free swelling index (FSI)		1.0
Moisture (as rec'd)		
Inherent	%	0.96
Adherent	%	1.16

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: 1 Byron Creek Coll. is a subsidiary of Esso Minerals Can. Ltd.
2 Coal Mountain Mine was formerly named Corbin Mine

BYRON CREEK COLLIERIES LIMITED
Coal Mountain Mine; No. 1 Seam (Top Section); Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	17-08-84
Sampling location	Mine (surface) 3517 N 5730 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3937-84

Ash analysis, per cent:

SiO2	52.57
Al2O3	36.05
Fe2O3	1.63
Mn3O4	-
TiO2	1.78
P2O5	0.23
CaO	1.53
MgO	0.60
SO3	1.37
Na2O	0.34
K2O	0.26
SrO	0.09
BaO	0.26
Loss on fusion (LOF)	1.75

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	70
F	97.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1895 m

BYRON CREEK COLLIERIES LIMITED
Coal Mountain Mine; No. 1 Seam (Middle Section); Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	17-08-84
Sampling location	Mine (surface) 3517 N 5730 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3938-84
Rank of coal	Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	1.86		
Ash	%	10.74	10.94	
Volatile	%	24.47	24.93	27.99
Fixed carbon	%	62.94	64.13	72.01
Ultimate:				
Carbon	%	76.30	77.75	87.30
Hydrogen	%	4.03	4.11	4.61
Sulphur (Pyritic)	%	(0.02)	(0.02)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.12)	(0.12)	(0.14)
Total	%	0.14	0.14	-
Nitrogen	%	1.32	1.35	1.52
Ash	%	10.74	10.94	-
Oxygen, by difference	%	5.60	5.71	6.41
Heating value:				
	MJ/kg	30.21	30.79	34.57
	kcal/kg	7216	7353	8257
	Btu/lb	12990	13236	14862

Hardgrove grindability index		77
Free swelling index (FSI)		1.5
Moisture (as rec'd)		
Inherent	%	0.99
Adherent	%	0.87

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1335	1346
Spherical	°C	1357	1379
Hemispherical	°C	1404	1388
Fluid	°C	1446	1454

Notes: 1 Byron Creek Coll. is a subsidiary of Esso Minerals Can. Ltd.
2 Coal Mountain Mine was formerly named Corbin Mine

BYRON CREEK COLLIERIES LIMITED
Coal Mountain Mine; No. 1 Seam (Middle Section); Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	17-08-84
Sampling location	Mine (surface) 3517 N 5730 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3938-84

Ash analysis, per cent:

SiO_2	39.25
Al_2O_3	27.11
Fe_2O_3	3.78
Mn_3O_4	-
TiO_2	1.93
P_2O_5	0.16
CaO	15.92
MgO	3.70
SO_3	4.61
Na_2O	1.03
K_2O	0.09
SrO	0.17
BaO	0.77
Loss on fusion (LOF)	1.17

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	50
F	26.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1895 m

BYRON CREEK COLLIERIES LIMITED
Coal Mountain Mine; No. 1 Seam (Bottom Section); Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	17-08-84
Sampling location	Mine (surface) 3473 N 5740 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3934-84

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	2.22		
Ash	%	10.83	11.08	
Volatile	%	23.69	24.23	27.25
Fixed carbon	%	63.26	64.69	72.75
Ultimate:				
Carbon	%	75.77	77.49	87.15
Hydrogen	%	3.91	4.00	4.50
Sulphur (Pyritic)	%	(0.02)	(0.02)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.14)	(0.14)	(0.16)
Total	%	0.16	0.16	–
Nitrogen	%	1.30	1.33	1.50
Ash	%	10.83	11.08	–
Oxygen, by difference	%	5.81	5.94	6.68
Heating value:				
	MJ/kg	30.10	30.78	34.62
	kcal/kg	7189	7352	8268
	Btu/lb	12940	13233	14882

Hardgrove grindability index		85
Free swelling index (FSI)		1.0
Moisture (as rec'd)		
Inherent	%	1.00
Adherent	%	1.22

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1388	1418
Spherical	°C	1407	1424
Hemispherical	°C	1410	1446
Fluid	°C	1468	1482+

Notes: 1 Byron Creek Coll. is a subsidiary of Esso Minerals Can. Ltd.
2 Coal Mountain Mine was formerly named Corbin Mine

BYRON CREEK COLLIERIES LIMITED
Coal Mountain Mine; No. 1 Seam (Bottom Section); Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	17-08-84
Sampling location	Mine (surface) 3473 N 5740 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3934-84

Ash analysis, per cent:

SiO2	42.02
Al2O3	28.98
Fe2O3	3.04
Mn3O4	–
TiO2	1.90
P2O5	0.25
CaO	13.89
MgO	2.44
SO3	4.44
Na2O	1.04
K2O	0.13
SrO	0.26
BaO	0.80
Loss on fusion (LOF)	1.49

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	70
F	42.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1895 m

BYRON CREEK COLLIERIES LIMITED
Coal Mountain Mine; No.1 Seam; Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	17-08-84
Sampling location	Preparation Plant
Product name	Raw Coal Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3935-84

Rank of coal		Medium-volatile bituminous		
		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	3.09		
Ash	%	14.37	14.83	
Volatile	%	23.00	23.73	27.86
Fixed carbon	%	59.54	61.44	72.14
Ultimate:				
Carbon	%	71.78	74.07	86.97
Hydrogen	%	3.80	3.92	4.60
Sulphur (Pyritic)	%	(0.04)	(0.04)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.14)	(0.14)	(0.17)
Total	%	0.19	0.20	–
Nitrogen	%	1.35	1.39	1.63
Ash	%	14.37	14.83	–
Oxygen, by difference	%	5.42	5.59	6.56
Heating value:				
	MJ/kg	28.59	29.50	34.64
	kcal/kg	6829	7046	8273
	Btu/lb	12291	12683	14891

Hardgrove grindability index		76
Free swelling index (FSI)		1.5
Moisture (as rec'd)		
Inherent	%	1.20
Adherent	%	1.89

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1263	1296
Spherical	°C	1296	1318
Hemispherical	°C	1377	1363
Fluid	°C	1429	1477

Notes: 1 Byron Creek Coll. is a subsidiary of Esso Minerals Can. Ltd.
2 Coal Mountain Mine was formerly named Corbin Mine

BYRON CREEK COLLIERIES LIMITED
Coal Mountain Mine; No.1 Seam; Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	17-08-84
Sampling location	Preparation Plant
Product name	Raw Coal Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3935-84

Ash analysis, per cent:

SiO_2	48.40
Al_2O_3	25.01
Fe_2O_3	3.44
Mn_3O_4	–
TiO_2	1.94
P_2O_5	0.69
CaO	9.95
MgO	3.17
SO_3	4.22
Na_2O	1.01
K_2O	0.18
SrO	0.25
BaO	0.85
Loss on fusion (LOF)	0.91

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	60
F	114.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

BYRON CREEK COLLIERIES LIMITED
Coal Mountain Mine; No. 1 Seam; Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	17-08-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3936-84

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	3.88		
Ash	%	11.99	12.47	
Volatile	%	22.08	22.97	26.24
Fixed carbon	%	62.05	64.56	73.76
Ultimate:				
Carbon	%	72.84	75.78	86.58
Hydrogen	%	3.75	3.90	4.46
Sulphur (Pyritic)	%	(0.03)	(0.03)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.17)	(0.17)	(0.20)
Total	%	0.20	0.21	-
Nitrogen	%	1.24	1.29	1.47
Ash	%	11.99	12.47	-
Oxygen, by difference	%	6.10	6.35	7.25
Heating value:				
	MJ/kg	28.98	30.15	34.44
	kcal/kg	6921	7201	8226
	Btu/lb	12458	12961	14807

Hardgrove grindability index		70
Free swelling index (FSI)		1.0
Moisture (as rec'd)		
Inherent	%	1.53
Adherent	%	2.35

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1360	1352
Spherical	°C	1468	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: 1 Byron Creek Coll. is a subsidiary of Esso Minerals Can. Ltd.
2 Coal Mountain Mine was formerly named Corbin Mine

BYRON CREEK COLLIERIES LIMITED
Coal Mountain Mine; No. 1 Seam; Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	17-08-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3936-84

Ash analysis, per cent:

SiO2	49.18
Al2O3	28.57
Fe2O3	2.55
Mn3O4	-
TiO2	1.91
P2O5	0.74
CaO	6.19
MgO	1.72
SO3	3.11
Na2O	1.04
K2O	0.22
SrO	0.25
BaO	0.68
Loss on fusion (LOF)	1.92

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	50
F	73.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

WESTAR MINING LTD.
Michel Underground Mine; No. 10 Seam (Top Sect.); Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	27-09-84
Sampling location	(Hydraulic) Mine (u/g) 5331.66 S 2605.51 W
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2076-85

Rank of coal	Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	2.75		
Ash	%	8.12	8.35	
Volatile	%	20.67	21.26	23.20
Fixed carbon	%	68.45	70.39	76.80
Ultimate:				
Carbon	%	80.32	82.60	90.13
Hydrogen	%	4.46	4.59	5.01
Sulphur (Pyritic)	%	(0.04)	(0.04)	–
(Sulphate)	%	(0.05)	(0.05)	–
(Organic)	%	(0.24)	(0.24)	(0.26)
Total	%	0.32	0.33	–
Nitrogen	%	1.41	1.45	1.58
Ash	%	8.12	8.35	–
Oxygen, by difference	%	2.61	2.68	2.92
Heating value:				
	MJ/kg	32.28	33.19	36.22
	kcal/kg	7709	7928	8650
	Btu/lb	13877	14270	15570

Hardgrove grindability index		95
Free swelling index (FSI)		8.0
Moisture (as rec'd)		
Inherent	%	0.77
Adherent	%	1.98

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: 1 Westar Mining Ltd. was formerly named B.C. Coal Ltd.
2 10 Seam has been refered to as Balmer Seam in some reports

WESTAR MINING LTD.
Michel Underground Mine; No. 10 Seam (Top Sect.); Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	27-09-84
Sampling location	(Hydraulic) Mine (u/g) 5331.66 S 2605.51 W
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2076-85

Ash analysis, per cent:

SiO2	53.52
Al2O3	34.20
Fe2O3	2.23
Mn3O4	-
TiO2	1.95
P2O5	0.21
CaO	1.82
MgO	0.69
SO3	2.02
Na2O	0.25
K2O	0.14
SrO	0.03
BaO	0.14
Loss on fusion (LOF)	1.51

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1373.8 m

WESTAR MINING LTD.
Michel Underground Mine; No. 10 Seam (Bot. Sect.); Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	27-09-84
Sampling location	(Hydraulic) Mine (u/g) 4711.79 S 1077.73 W
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2078-85

Rank of coal	Low-volatile bituminous		
Proximate analysis:	As Rec'd	Dry	Dry Ash Free
Moisture .... %	2.30		
Ash .... %	15.37	15.73	
Volatile .... %	18.52	18.96	22.50
Fixed carbon .... %	63.81	65.31	77.50
Ultimate:			
Carbon .... %	74.43	76.18	90.40
Hydrogen .... %	4.07	4.17	4.95
Sulphur (Pyritic) .... %	(0.03)	(0.03)	-
(Sulphate) .... %	(0.00)	(0.00)	-
(Organic) .... %	(0.15)	(0.15)	(0.18)
Total .... %	0.18	0.18	-
Nitrogen .... %	1.21	1.24	1.47
Ash .... %	15.37	15.73	-
Oxygen, by difference ...... %	2.44	2.50	2.97
Heating value:			
MJ/kg	29.35	30.04	35.65
kcal/kg	7011	7176	8516
Btu/lb	12620	12917	15328

Hardgrove grindability index	91	
Free swelling index (FSI)	5.0	
Moisture (as rec'd)		
Inherent .... %	0.73	
Adherent .... %	1.57	
Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1482+	1482+
Spherical .... °C	1482+	1482+
Hemispherical .... °C	1482+	1482+
Fluid .... °C	1482+	1482+

Notes: 1 Westar Mining Ltd. was formerly named B.C. Coal Ltd.
2 10 Seam has been refered to as Balmer Seam in some reports

WESTAR MINING LTD.
Michel Underground Mine; No. 10 Seam (Bot. Sect.); Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	27-09-84
Sampling location	(Hydraulic) Mine (u/g) 4711.79 S 1077.73 W
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2078-85

Ash analysis, per cent:

SiO2	56.57
Al2O3	34.60
Fe2O3	1.03
Mn3O4	-
TiO2	1.36
P2O5	0.20
CaO	1.51
MgO	0.34
SO3	1.21
Na2O	0.16
K2O	0.11
SrO	0.01
BaO	0.25
Loss on fusion (LOF)	1.11

Volatile trace element analysis ug/g (ppm)

Hg	0.11
Cl	-
F	-
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1373.8 m

WESTAR MINING LTD.

Michel Underground Mine; No. 10 Seam; Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	27-09-84
Sampling location	Preparation Plant
Product name	Raw Coal Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2074-85
Rank of coal	Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.77		
Ash	%	24.41	24.85	
Volatile	%	19.34	19.69	26.20
Fixed carbon	%	54.48	55.46	73.80
Ultimate:				
Carbon	%	64.51	65.67	87.39
Hydrogen	%	3.63	3.70	4.92
Sulphur (Pyritic)	%	(0.13)	(0.13)	–
(Sulphate)	%	(0.02)	(0.02)	–
(Organic)	%	(0.19)	(0.19)	(0.26)
Total	%	0.34	0.35	–
Nitrogen	%	1.02	1.04	1.38
Ash	%	24.41	24.85	–
Oxygen, by difference	%	4.31	4.39	5.84
Heating value:				
	MJ/kg	25.35	25.81	34.35
	kcal/kg	6056	6165	8204
	Btu/lb	10900	11097	14766

Hardgrove grindability index	72
Free swelling index (FSI)	2.5
Moisture (as rec'd)	
Inherent .... %	0.86
Adherent .... %	0.91

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: 1 Westar Mining Ltd. was formerly named B.C. Coal Ltd.
2 10 Seam has been refered to as Balmer Seam in some reports

WESTAR MINING LTD.
Michel Underground Mine; No. 10 Seam; Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	27-09-84
Sampling location	Preparation Plant
Product name	Raw Coal Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2074-85

Ash analysis, per cent:

SiO_2	63.50
Al_2O_3	25.23
Fe_2O_3	2.77
Mn_3O_4	–
TiO_2	1.29
P_2O_5	0.34
CaO	1.30
MgO	0.52
SO_3	1.10
Na_2O	0.08
K_2O	1.44
SrO	0.02
BaO	0.26
Loss on fusion (LOF)	0.88

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

WESTAR MINING LTD.
Michel Underground Mine; No. 10 Seam; Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	27-09-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	Minus 51
(Screen opening ,in)	Minus 2
ERL number	2079-85

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	4.47		
Ash	%	9.51	9.95	
Volatile	%	20.19	21.13	23.46
Fixed carbon	%	65.84	68.92	76.54
Ultimate:				
Carbon	%	78.08	81.73	90.76
Hydrogen	%	4.24	4.44	4.93
Sulphur (Pyritic)	%	(0.04)	(0.04)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.22)	(0.23)	(0.26)
Total	%	0.26	0.27	–
Nitrogen	%	1.32	1.38	1.53
Ash	%	9.51	9.95	–
Oxygen, by difference	%	2.13	2.23	2.48
Heating value:				
	MJ/kg	30.98	32.43	36.02
	kcal/kg	7400	7747	8603
	Btu/lb	13321	13944	15485

Hardgrove grindability index		86
Free swelling index (FSI)		6.0
Moisture (as rec'd)		
Inherent	%	0.80
Adherent	%	3.67

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: 1 Westar Mining Ltd. was formerly named B.C. Coal Ltd.
2 10 Seam has been refered to as Balmer Seam in some reports

WESTAR MINING LTD.
Michel Underground Mine; No. 10 Seam; Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	27-09-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	Minus 51
(Screen opening ,in)	Minus 2
ERL number	2079-85

Ash analysis, per cent:

SiO_2	60.41
Al_2O_3	27.69
Fe_2O_3	2.70
Mn_3O_4	–
TiO_2	1.58
P_2O_5	0.53
CaO	1.89
MgO	0.43
SO_3	1.01
Na_2O	0.12
K_2O	0.29
SrO	0.03
BaO	0.25
Loss on fusion (LOF)	1.10

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

WESTAR MINING LTD.
Harmer Surface Mine; No. 8 Seam; Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	28-09-84
Sampling location	Mine (surface) Sampled from stockpile
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2077-85

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	2.48		
Ash	%	39.98	41.00	
Volatile	%	18.73	19.21	32.56
Fixed carbon	%	38.80	39.79	67.44
Ultimate:				
Carbon	%	49.39	50.64	85.83
Hydrogen	%	3.28	3.36	5.69
Sulphur (Pyritic)	%	(0.19)	(0.19)	–
(Sulphate)	%	(0.03)	(0.03)	–
(Organic)	%	(0.18)	(0.18)	(0.31)
Total	%	0.39	0.40	–
Nitrogen	%	0.96	0.98	1.66
Ash	%	39.98	41.00	–
Oxygen, by difference	%	3.53	3.62	6.14
Heating value:				
	MJ/kg	19.45	19.94	33.80
	kcal/kg	4645	4763	8073
	Btu/lb	8361	8573	14531

Hardgrove grindability index		62
Free swelling index (FSI)		1.0
Moisture (as rec'd)		
Inherent	%	0.89
Adherent	%	1.59

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Westar Mining Ltd. was formerly named B.C. Coal Ltd.

WESTAR MINING LTD.
Harmer Surface Mine; No. 8 Seam; Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	28-09-84
Sampling location	Mine (surface) Sampled from stockpile
Product name	Mine run
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2077-85

Ash analysis, per cent:

SiO_2	65.43
Al_2O_3	24.85
Fe_2O_3	1.71
Mn_3O_4	–
TiO_2	1.25
P_2O_5	0.26
CaO	0.64
MgO	0.72
SO_3	0.54
Na_2O	0.06
K_2O	1.94
SrO	0.03
BaO	–
Loss on fusion (LOF)	1.03

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	–
F	–
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1804.4 m

WESTAR MINING LTD.

Harmer Surface Mine; No. 10 Seam; Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	28-09-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2075-85

Rank of coal	Low-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	5.37		
Ash	%	13.21	13.96	
Volatile	%	18.63	19.69	22.88
Fixed carbon	%	62.78	66.35	77.12
Ultimate:				
Carbon	%	72.96	77.10	89.61
Hydrogen	%	3.88	4.10	4.77
Sulphur (Pyritic)	%	(0.03)	(0.03)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.17)	(0.18)	(0.21)
Total	%	0.20	0.21	–
Nitrogen	%	1.22	1.29	1.50
Ash	%	13.21	13.96	–
Oxygen, by difference	%	3.16	3.34	3.88
Heating value:				
	MJ/kg	28.99	30.64	35.61
	kcal/kg	6925	7318	8506
	Btu/lb	12465	13173	15310

Hardgrove grindability index		112
Free swelling index (FSI)		2.0
Moisture (as rec'd)		
Inherent	%	0.76
Adherent	%	4.61

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Westar Mining Ltd. was formerly named B.C. Coal Ltd.

WESTAR MINING LTD.
Harmer Surface Mine; No. 10 Seam; Crowsnest Coalfield
Sparwood, British Columbia

Sampling date	28-09-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2075-85

Ash analysis, per cent:

SiO_2	57.46
Al_2O_3	32.90
Fe_2O_3	0.92
Mn_3O_4	–
TiO_2	1.95
P_2O_5	0.09
CaO	0.77
MgO	0.38
SO_3	0.43
Na_2O	0.04
K_2O	0.15
SrO	0.02
BaO	0.09
Loss on fusion (LOF)	4.20

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	70
F	63.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1636.8 m

WESTAR MINING LTD.
Greenhills Mine; No. 26 Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	16-08-84
Sampling location	Mine (surface) 5553912 N 651900 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3929-84

Rank of coal .... High-volatile A bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	2.09		
Ash	%	4.88	4.98	
Volatile	%	31.07	31.73	33.39
Fixed carbon	%	61.97	63.29	66.61
Ultimate:				
Carbon	%	79.36	81.05	85.30
Hydrogen	%	4.93	5.04	5.30
Sulphur (Pyritic)	%	(0.02)	(0.02)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.38)	(0.38)	(0.40)
Total	%	0.40	0.41	-
Nitrogen	%	1.67	1.71	1.80
Ash	%	4.88	4.98	-
Oxygen, by difference	%	6.67	6.81	7.17
Heating value:				
	MJ/kg	32.57	33.27	35.01
	kcal/kg	7780	7946	8363
	Btu/lb	14004	14303	15053

Hardgrove grindability index		63
Free swelling index (FSI)		6.5
Moisture (as rec'd)		
Inherent	%	1.14
Adherent	%	0.95

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1352	1432
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Westar Mining Ltd. was formerly named B.C. Coal Ltd.

WESTAR MINING LTD.
Greenhills Mine; No. 26 Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	16-08-84
Sampling location	Mine (surface) 5553912 N 651900 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3929-84

Ash analysis, per cent:

SiO_2	51.85
Al_2O_3	30.16
Fe_2O_3	3.62
Mn_3O_4	–
TiO_2	1.41
P_2O_5	4.05
CaO	2.57
MgO	–
SO_3	1.11
Na_2O	0.06
K_2O	0.40
SrO	1.31
BaO	1.24
Loss on fusion (LOF)	0.84

Volatile trace element analysis ug/g (ppm)

Hg	0.02
Cl	30
F	181.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

WESTAR MINING LTD.
Greenhills Mine; No. 16 (Cougar) Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	16-08-84
Sampling location	Mine (surface) 5553680 N 651760 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3930-84
Rank of coal	Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	1.80		
Ash	%	8.84	9.00	
Volatile	%	26.83	27.32	30.02
Fixed carbon	%	62.53	63.68	69.98
Ultimate:				
Carbon	%	77.36	78.78	86.57
Hydrogen	%	4.51	4.59	5.04
Sulphur (Pyritic)	%	(0.04)	(0.04)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.42)	(0.42)	(0.47)
Total	%	0.47	0.48	–
Nitrogen	%	1.49	1.52	1.67
Ash	%	8.84	9.00	–
Oxygen, by difference	%	5.53	5.63	6.19
Heating value:				
	MJ/kg	31.20	31.77	34.92
	kcal/kg	7452	7589	8339
	Btu/lb	13414	13660	15011

Hardgrove grindability index		70
Free swelling index (FSI)		5.5
Moisture (as rec'd)		
Inherent	%	1.06
Adherent	%	0.74

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Westar Mining Ltd. was formerly named B.C. Coal Ltd.

WESTAR MINING LTD.
Greenhills Mine; No. 16 (Cougar) Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	16-08-84
Sampling location	Mine (surface) 5553680 N 651760 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3930-84

Ash analysis, per cent:

SiO2	63.98
Al2O3	26.17
Fe2O3	1.17
Mn3O4	–
TiO2	1.23
P2O5	0.80
CaO	0.75
MgO	0.46
SO3	0.03
Na2O	0.09
K2O	1.44
SrO	0.20
BaO	0.38
Loss on fusion (LOF)	0.80

Volatile trace element analysis ug/g (ppm)

Hg	0.02
Cl	40
F	95.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 2181.0

WESTAR MINING LTD.
Greenhills Mine; No. 1 (CTR) Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	16-08-84
Sampling location	Mine (surface) 5551225 N 652875 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3931-84

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	1.87		
Ash	%	13.18	13.43	
Volatile	%	22.76	23.19	26.79
Fixed carbon	%	62.19	63.38	73.21
Ultimate:				
Carbon	%	75.20	76.64	88.53
Hydrogen	%	4.24	4.32	4.99
Sulphur (Pyritic)	%	(0.04)	(0.04)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.16)	(0.16)	(0.19)
Total	%	0.20	0.20	–
Nitrogen	%	1.27	1.29	1.49
Ash	%	13.18	13.43	–
Oxygen, by difference	%	4.04	4.12	4.76
Heating value:				
	MJ/kg	30.10	30.67	35.43
	kcal/kg	7188	7326	8462
	Btu/lb	12939	13186	15232

Hardgrove grindability index		121
Free swelling index (FSI)		6.0
Moisture (as rec'd)		
Inherent	%	0.53
Adherent	%	1.34

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Westar Mining Ltd. was formerly named B.C. Coal Ltd.

WESTAR MINING LTD.
Greenhills Mine; No. 1 (CTR) Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	16-08-84
Sampling location	Mine (surface) 5551225 N 652875 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3931-84

Ash analysis, per cent:

SiO2	53.31
Al2O3	38.05
Fe2O3	1.81
Mn3O4	-
TiO2	1.95
P2O5	0.85
CaO	1.49
MgO	-
SO3	0.41
Na2O	0.05
K2O	0.09
SrO	0.02
BaO	-
Loss on fusion (LOF)	0.37

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	30
F	127.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

WESTAR MINING LTD.
Greenhills Mine; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	16-08-84
Sampling location	Preparation Plant
Product name	Raw Coal Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3932-84

Rank of coal		Medium-volatile bituminous		
Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	3.08		
Ash	%	17.43	17.98	
Volatile	%	24.13	24.90	30.36
Fixed carbon	%	55.36	57.12	69.64
Ultimate:				
Carbon	%	68.96	71.15	86.75
Hydrogen	%	4.05	4.18	5.10
Sulphur (Pyritic)	%	(0.12)	(0.12)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.32)	(0.33)	(0.41)
Total	%	0.45	0.46	–
Nitrogen	%	1.40	1.44	1.76
Ash	%	17.43	17.98	–
Oxygen, by difference	%	4.64	4.79	5.84
Heating value:				
	MJ/kg	27.84	28.73	35.03
	kcal/kg	6650	6862	8366
	Btu/lb	11971	12351	15059

Hardgrove grindability index		88	
Free swelling index (FSI)		6.0	
Moisture (as rec'd)			
Inherent	%	1.10	
Adherent	%	1.98	
Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1357	1416
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Westar Mining Ltd. was formerly named B.C. Coal Ltd.

WESTAR MINING LTD.
Greenhills Mine; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	16-08-84
Sampling location	Preparation Plant
Product name	Raw Coal Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3932-84

Ash analysis, per cent:

SiO2	61.55
Al2O3	25.10
Fe2O3	4.28
Mn3O4	-
TiO2	1.23
P2O5	1.28
CaO	1.72
MgO	1.14
SO3	1.10
Na2O	0.09
K2O	2.03
SrO	0.10
BaO	0.50
Loss on fusion (LOF)	0.78

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	30
F	222.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

WESTAR MINING LTD.
Greenhills Mine; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	16-08-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3933-84

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	3.38		
Ash	%	6.21	6.43	
Volatile	%	26.46	27.39	29.27
Fixed carbon	%	63.94	66.18	70.73
Ultimate:				
Carbon	%	78.88	81.64	87.25
Hydrogen	%	4.52	4.68	5.00
Sulphur (Pyritic)	%	(0.04)	(0.04)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.41)	(0.42)	(0.45)
Total	%	0.45	0.47	–
Nitrogen	%	1.57	1.62	1.73
Ash	%	6.21	6.43	–
Oxygen, by difference	%	4.99	5.16	5.51
Heating value:				
	MJ/kg	32.10	33.23	35.51
	kcal/kg	7668	7937	8482
	Btu/lb	13802	14286	15268

Hardgrove grindability index		92
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	1.06
Adherent	%	2.32

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Westar Mining Ltd. was formerly named B.C. Coal Ltd.

WESTAR MINING LTD.
Greenhills Mine; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	16-08-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3933-84

Ash analysis, per cent:

SiO2	52.97
Al2O3	29.40
Fe2O3	4.89
Mn3O4	-
TiO2	1.84
P2O5	2.81
CaO	3.05
MgO	0.64
SO3	0.93
Na2O	0.09
K2O	0.74
SrO	0.23
BaO	0.54
Loss on fusion (LOF)	0.81

Volatile trace element analysis ug/g (ppm)

Hg	0.03
Cl	60
F	141.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORDING COAL LTD.
Fording River Mine; G Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3907-84
Rank of coal	Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	1.38		
Ash	%	13.72	13.91	
Volatile	%	22.63	22.95	26.66
Fixed carbon	%	62.27	63.14	73.34
Ultimate:				
Carbon	%	73.49	74.52	86.56
Hydrogen	%	4.41	4.47	5.19
Sulphur (Pyritic)	%	(0.08)	(0.08)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.52)	(0.53)	(0.61)
Total	%	0.61	0.62	–
Nitrogen	%	1.58	1.60	1.86
Ash	%	13.72	13.91	–
Oxygen, by difference	%	4.81	4.88	5.67
Heating value:				
	MJ/kg	30.03	30.45	35.37
	kcal/kg	7172	7272	8447
	Btu/lb	12910	13090	15205

Hardgrove grindability index		106
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	0.96
Adherent	%	0.42

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1229	1379
Spherical	°C	1435	1482+
Hemispherical	°C	1466	1482+
Fluid	°C	1482+	1482+

Notes:

FORDING COAL LTD.
Fording River Mine; G Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3907-84

Ash analysis, per cent:

SiO2	64.51
Al2O3	23.03
Fe2O3	5.74
Mn3O4	-
TiO2	1.33
P2O5	1.36
CaO	1.71
MgO	0.43
SO3	-
Na2O	0.09
K2O	1.20
SrO	0.13
BaO	0.28
Loss on fusion (LOF)	0.32

Volatile trace element analysis ug/g (ppm)

Hg	0.03
Cl	40
F	201.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORDING COAL LTD.
Fording River Mine; K (No.15) Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3908-84

Rank of coal	High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.06		
Ash	%	7.17	7.25	
Volatile	%	33.04	33.39	36.00
Fixed carbon	%	58.73	59.36	64.00
Ultimate:				
Carbon	%	78.29	79.13	85.32
Hydrogen	%	5.11	5.16	5.56
Sulphur (Pyritic)	%	(0.09)	(0.09)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.26)	(0.26)	(0.28)
Total	%	0.36	0.36	–
Nitrogen	%	1.81	1.83	1.97
Ash	%	7.17	7.25	–
Oxygen, by difference	%	6.20	6.27	6.76
Heating value:				
	MJ/kg	32.28	32.62	35.17
	kcal/kg	7709	7792	8401
	Btu/lb	13877	14025	15121

Hardgrove grindability index		62
Free swelling index (FSI)		7.5
Moisture (as rec'd)		
Inherent	%	0.81
Adherent	%	0.25

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1132	1327
Spherical	°C	1349	1404
Hemispherical	°C	1377	1427
Fluid	°C	1379	1482+

Notes:

FORDING COAL LTD.
Fording River Mine; K (No.15) Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3908-84

Ash analysis, per cent:

SiO_2	51.70
Al_2O_3	21.99
Fe_2O_3	16.41
Mn_3O_4	-
TiO_2	0.98
P_2O_5	0.21
CaO	2.02
MgO	1.65
SO_3	0.64
Na_2O	0.22
K_2O	1.43
SrO	0.04
BaO	0.39
Loss on fusion (LOF)	0.59

Volatile trace element analysis ug/g (ppm)

Hg	0.02
Cl	50
F	48.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORDING COAL LTD.
Fording River Mine; No. 8 Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3909-84

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	0.79		
Ash	%	30.63	30.87	
Volatile	%	19.05	19.20	27.77
Fixed carbon	%	49.54	49.93	72.23
Ultimate:				
Carbon	%	59.12	59.59	86.20
Hydrogen	%	3.51	3.54	5.12
Sulphur (Pyritic)	%	(0.07)	(0.07)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.42)	(0.42)	(0.61)
Total	%	0.49	0.49	–
Nitrogen	%	0.88	0.89	1.29
Ash	%	30.63	30.87	–
Oxygen, by difference	%	4.58	4.62	6.68
Heating value:				
	MJ/kg	23.55	23.74	34.34
	kcal/kg	5626	5671	8203
	Btu/lb	10127	10207	14765

Hardgrove grindability index		73
Free swelling index (FSI)		2.0
Moisture (as rec'd)		
Inherent	%	0.50
Adherent	%	0.29

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Analysis results were obtained by averaging the results from the top and bottom portions of the seam.

FORDING COAL LTD.
Fording River Mine; No. 8 Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3909-84

Ash analysis, per cent:

SiO2	59.78
Al2O3	33.61
Fe2O3	1.50
Mn3O4	—
TiO2	1.47
P2O5	0.11
CaO	0.16
MgO	—
SO3	—
Na2O	0.06
K2O	1.08
SrO	0.05
BaO	0.23
Loss on fusion (LOF)	0.83

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	40
F	148.
Br	—
As	—
Se	—

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORDING COAL LTD.
Fording River Mine; E Seam (No. 3 Pit); Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3910-84

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	0.97		
Ash	%	18.77	18.95	
Volatile	%	23.45	23.68	29.22
Fixed carbon	%	56.81	57.37	70.78
Ultimate:				
Carbon	%	70.55	71.24	87.90
Hydrogen	%	4.22	4.26	5.26
Sulphur (Pyritic)	%	(0.06)	(0.06)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.31)	(0.31)	(0.38)
Total	%	0.37	0.37	–
Nitrogen	%	1.26	1.27	1.57
Ash	%	18.77	18.95	–
Oxygen, by difference	%	3.87	3.91	4.82
Heating value:				
	MJ/kg	28.64	28.92	35.69
	kcal/kg	6841	6908	8524
	Btu/lb	12315	12435	15342

Hardgrove grindability index		100
Free swelling index (FSI)		7.5
Moisture (as rec'd)		
Inherent	%	0.43
Adherent	%	0.54

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

FORDING COAL LTD.
Fording River Mine; E Seam (No. 3 Pit); Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3910-84

Ash analysis, per cent:

SiO2	61.10
Al2O3	31.34
Fe2O3	0.73
Mn3O4	–
TiO2	1.65
P2O5	0.25
CaO	0.46
MgO	0.36
SO3	0.18
Na2O	0.07
K2O	0.94
SrO	0.07
BaO	–
Loss on fusion (LOF)	0.88

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	30
F	133.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORDING COAL LTD.
Fording River Mine; F (No. 9) Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3911-84

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.43		
Ash	%	12.05	12.23	
Volatile	%	23.01	23.34	26.59
Fixed carbon	%	63.51	64.43	73.41
Ultimate:				
Carbon	%	76.14	77.25	88.01
Hydrogen	%	4.23	4.29	4.89
Sulphur (Pyritic)	%	(0.06)	(0.06)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.35)	(0.35)	(0.40)
Total	%	0.40	0.41	-
Nitrogen	%	1.36	1.38	1.57
Ash	%	12.05	12.23	-
Oxygen, by difference	%	4.38	4.44	5.06
Heating value:				
	MJ/kg	30.45	30.89	35.20
	kcal/kg	7272	7378	8406
	Btu/lb	13090	13281	15132

Hardgrove grindability index		85
Free swelling index (FSI)		4.0
Moisture (as rec'd)		
Inherent	%	0.58
Adherent	%	0.85

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1224	1299
Spherical	°C	1357	1421
Hemispherical	°C	1432	1435
Fluid	°C	1479	1468

Notes:

FORDING COAL LTD.
Fording River Mine; F (No. 9) Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3911-84

Ash analysis, per cent:

SiO_2	48.40
Al_2O_3	25.81
Fe_2O_3	13.26
Mn_3O_4	-
TiO_2	1.20
P_2O_5	2.45
CaO	3.79
MgO	0.64
SO_3	0.61
Na_2O	0.09
K_2O	0.49
SrO	0.08
BaO	0.49
Loss on fusion (LOF)	0.87

Volatile trace element analysis ug/g (ppm)

Hg	0.03
Cl	30
F	282.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORDING COAL LTD.
Fording River Mine; B (No. 4) Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3912-84

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture		0.91		
Ash	%	7.22	7.29	
Volatile	%	21.64	21.84	23.56
Fixed carbon	%	70.23	70.87	76.44
Ultimate:				
Carbon	%	82.08	82.83	89.34
Hydrogen	%	4.40	4.44	4.79
Sulphur (Pyritic)	%	(0.04)	(0.04)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.18)	(0.18)	(0.20)
Total	%	0.22	0.22	–
Nitrogen	%	1.43	1.44	1.55
Ash	%	7.22	7.29	–
Oxygen, by difference	%	3.75	3.78	4.08
Heating value:				
	MJ/kg	32.94	33.24	35.85
	kcal/kg	7867	7939	8563
	Btu/lb	14160	14290	15414

Hardgrove grindability index		94
Free swelling index (FSI)		5.5
Moisture (as rec'd)		
Inherent	%	0.46
Adherent	%	0.45

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1318	1454
Spherical	°C	1471	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

FORDING COAL LTD.
Fording River Mine; B (No. 4) Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3912-84

Ash analysis, per cent:

SiO_2	46.33
Al_2O_3	31.88
Fe_2O_3	12.33
Mn_3O_4	-
TiO_2	1.79
P_2O_5	0.78
CaO	2.18
MgO	1.20
SO_3	0.73
Na_2O	0.13
K_2O	0.23
SrO	0.01
BaO	-
Loss on fusion (LOF)	0.49

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	30
F	72.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORDING COAL LTD.
Fording River Mine; No. 7 Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3913-84
Rank of coal	Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	0.82		
Ash	%	30.13	30.38	
Volatile	%	18.32	18.47	26.53
Fixed carbon	%	50.73	51.15	73.47
Ultimate:				
Carbon	%	61.16	61.66	88.57
Hydrogen	%	3.45	3.48	5.00
Sulphur (Pyritic)	%	(0.14)	(0.14)	-
(Sulphate)	%	(0.02)	(0.02)	-
(Organic)	%	(0.24)	(0.24)	(0.35)
Total	%	0.40	0.40	-
Nitrogen	%	1.06	1.07	1.54
Ash	%	30.13	30.38	-
Oxygen, by difference	%	2.99	3.01	4.32
Heating value:				
	MJ/kg	24.33	24.53	35.24
	kcal/kg	5811	5859	8416
	Btu/lb	10461	10547	15149

Hardgrove grindability index		69
Free swelling index (FSI)		2.0
Moisture (as rec'd)		
Inherent	%	0.51
Adherent	%	0.31

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

FORDING COAL LTD.
Fording River Mine; No. 7 Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3913-84

Ash analysis, per cent:

SiO_2	68.05
Al_2O_3	23.98
Fe_2O_3	1.36
Mn_3O_4	-
TiO_2	1.07
P_2O_5	0.04
CaO	0.07
MgO	0.81
SO_3	0.51
Na_2O	0.09
K_2O	2.51
SrO	0.07
BaO	0.23
Loss on fusion (LOF)	0.49

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	30
F	207.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORDING COAL LTD.
Fording River Mine; No. 13 Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3914-84
Rank of coal	Subbituminous A

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Equilibrium moisture	%	16.53		
Ash	%	9.92	11.88	
Volatile	%	26.17	31.35	35.58
Fixed carbon	%	47.39	56.77	64.42
Ultimate:				
Carbon	%	57.54	68.93	78.22
Hydrogen	%	3.13	3.75	4.26
Sulphur (Pyritic)	%	(0.06)	(0.07)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.36)	(0.43)	(0.49)
Total	%	0.43	0.52	–
Nitrogen	%	1.27	1.52	1.72
Ash	%	9.92	11.88	–
Oxygen, by difference	%	11.18	13.40	15.21
Heating value:				
	MJ/kg	21.89	26.23	29.76
	kcal/kg	5228	6264	7108
	Btu/lb	9411	11275	12795

Hardgrove grindability index		121
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1235	1288
Spherical	°C	1307	1313
Hemispherical	°C	1371	1360
Fluid	°C	1477	1418

Notes:

FORDING COAL LTD.
Fording River Mine; No. 13 Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3914-84

Ash analysis, per cent:

SiO2	35.53
Al2O3	20.11
Fe2O3	2.79
Mn3O4	-
TiO2	1.14
P2O5	0.84
CaO	18.91
MgO	2.56
SO3	15.68
Na2O	0.06
K2O	0.83
SrO	0.18
BaO	0.77
Loss on fusion (LOF)	1.99

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	40
F	98.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORDING COAL LTD.
Fording River Mine; "H" Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3915-84

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.63		
Ash	%	10.35	10.52	
Volatile	%	27.80	28.26	31.58
Fixed carbon	%	60.22	61.22	68.42
Ultimate:				
Carbon	%	75.74	77.00	86.05
Hydrogen	%	4.64	4.72	5.27
Sulphur (Pyritic)	%	(0.05)	(0.05)	-
(Sulphate)	%	(0.01)	(0.01)	-
(Organic)	%	(0.42)	(0.42)	(0.47)
Total	%	0.47	0.48	-
Nitrogen	%	1.68	1.71	1.91
Ash	%	10.35	10.52	-
Oxygen, by difference	%	5.48	5.57	6.22
Heating value:				
	MJ/kg	30.81	31.32	35.00
	kcal/kg	7358	7481	8360
	Btu/lb	13245	13465	15048

Hardgrove grindability index		75	
Free swelling index (FSI)		7.5	
Moisture (as rec'd)			
Inherent	%	0.98	
Adherent	%	0.65	
Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

FORDING COAL LTD.
Fording River Mine; "H" Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3915-84

Ash analysis, per cent:

SiO2	57.70
Al2O3	35.07
Fe2O3	0.82
Mn3O4	-
TiO2	1.09
P2O5	0.54
CaO	0.85
MgO	0.48
SO3	0.98
Na2O	0.03
K2O	0.67
SrO	0.19
BaO	0.18
Loss on fusion (LOF)	0.78

Volatile trace element analysis ug/g (ppm)

Hg	0.03
Cl	30
F	96.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

FORDING COAL LTD.
Fording River Mine; "I" Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3916-84

Rank of coal .... High-volatile A bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	3.32		
Ash	%	6.05	6.26	
Volatile	%	29.17	30.17	32.18
Fixed carbon	%	61.46	63.57	67.82
Ultimate:				
Carbon	%	77.90	80.58	85.96
Hydrogen	%	4.68	4.84	5.16
Sulphur (Pyritic)	%	(0.05)	(0.05)	-
(Sulphate)	%	(0.01)	(0.01)	-
(Organic)	%	(0.52)	(0.54)	(0.57)
Total	%	0.58	0.60	-
Nitrogen	%	1.83	1.89	2.02
Ash	%	6.05	6.26	-
Oxygen, by difference	%	5.64	5.83	6.22
Heating value:				
	MJ/kg	32.01	33.11	35.32
	kcal/kg	7644	7907	8435
	Btu/lb	13760	14233	15183

Hardgrove grindability index		92
Free swelling index (FSI)		7.5
Moisture (as rec'd)		
Inherent	%	1.16
Adherent	%	2.16

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1335	1427
Spherical	°C	1477	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

FORDING COAL LTD.
Fording River Mine; "I" Seam; Elk Valley Coalfield
Elkford, British Columbia

Sampling date	14-08-84
Sampling location	Mine (surface)
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3916-84

Ash analysis, per cent:

SiO2	52.16
Al2O3	27.61
Fe2O3	6.85
Mn3O4	-
TiO2	1.46
P2O5	2.55
CaO	3.31
MgO	0.83
SO3	2.00
Na2O	0.07
K2O	0.66
SrO	0.43
BaO	0.56
Loss on fusion (LOF)	0.15

Volatile trace element analysis ug/g (ppm)

Hg	0.02
Cl	20
F	137.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 4 Seam (thermal) 1852 bench; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5534000 N 659800 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3917-84
Rank of coal	Subbituminous B

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Equilibrium moisture	%	16.19		
Ash	%	6.25	7.46	
Volatile	%	27.67	33.01	35.67
Fixed carbon	%	49.89	59.53	64.33
Ultimate:				
Carbon	%	58.78	70.14	75.79
Hydrogen	%	2.71	3.23	3.49
Sulphur (Pyritic)	%	(0.07)	(0.08)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.39)	(0.47)	(0.51)
Total	%	0.46	0.55	-
Nitrogen	%	1.16	1.38	1.49
Ash	%	6.25	7.46	-
Oxygen, by difference	%	14.45	17.24	18.63
Heating value:				
	MJ/kg	21.86	26.09	28.19
	kcal/kg	5222	6231	6733
	Btu/lb	9399	11215	12119

Hardgrove grindability index		135
Free swelling index (FSI)		N/A
Moisture (as rec'd)		
Inherent	%	
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1371	1402
Spherical	°C	1457	1482+
Hemispherical	°C	1477	1482+
Fluid	°C	1482+	1482+

Notes: Crows Nest Res. Ltd. is a subsidiary of Shell Can. Resources

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 4 Seam (thermal) 1852 bench; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5534000 N 659800 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3917-84

Ash analysis, per cent:

SiO_2	47.68
Al_2O_3	30.38
Fe_2O_3	3.85
Mn_3O_4	-
TiO_2	1.43
P_2O_5	0.71
CaO	7.60
MgO	1.51
SO_3	4.90
Na_2O	0.06
K_2O	0.22
SrO	0.21
BaO	0.38
Loss on fusion (LOF)	0.75

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	20
F	93.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1846 m

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 7 Seam (met) 1846 bench; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5534000N 659600 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3918-84

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	1.24		
Ash	%	23.49	23.78	
Volatile	%	20.10	20.35	26.70
Fixed carbon	%	55.18	55.87	73.30
Ultimate:				
Carbon	%	65.54	66.36	87.06
Hydrogen	%	3.78	3.83	5.02
Sulphur (Pyritic)	%	(0.08)	(0.08)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.36)	(0.36)	(0.48)
Total	%	0.43	0.44	–
Nitrogen	%	1.25	1.27	1.67
Ash	%	23.49	23.78	–
Oxygen, by difference	%	4.27	4.32	5.67
Heating value:				
	MJ/kg	26.01	26.33	34.55
	kcal/kg	6212	6289	8252
	Btu/lb	11181	11321	14853

Hardgrove grindability index		79
Free swelling index (FSI)		2.0
Moisture (as rec'd)		
Inherent	%	0.88
Adherent	%	0.36

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Crows Nest Res. Ltd. is a subsidiary of Shell Can. Resources

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 7 Seam (met) 1846 bench; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5534000N 659600 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3918-84

Ash analysis, per cent:

SiO_2	61.20
Al_2O_3	27.55
Fe_2O_3	3.03
Mn_3O_4	-
TiO_2	1.61
P_2O_5	1.50
CaO	1.81
MgO	0.59
SO_3	0.46
Na_2O	0.07
K_2O	1.20
SrO	0.08
BaO	0.40
Loss on fusion (LOF)	0.07

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	40
F	343.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1845 m

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 9 Seam (thermal); Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5533800 N 659500 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3920-84

Rank of coal .... Low-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.94		
Ash	%	29.01	29.59	
Volatile	%	16.42	16.75	23.79
Fixed carbon	%	52.62	53.66	76.21
Ultimate:				
Carbon	%	60.80	62.00	88.06
Hydrogen	%	3.33	3.40	4.83
Sulphur (Pyritic)	%	(0.05)	(0.05)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.27)	(0.27)	(0.39)
Total	%	0.31	0.32	-
Nitrogen	%	0.87	0.89	1.26
Ash	%	29.01	29.59	-
Oxygen, by difference	%	3.73	3.80	5.40
Heating value:				
	MJ/kg	24.21	24.69	35.06
	kcal/kg	5782	5897	8375
	Btu/lb	10408	10614	15075

Hardgrove grindability index		71
Free swelling index (FSI)		1.5
Moisture (as rec'd)		
Inherent	%	0.44
Adherent	%	1.50

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Crows Nest Res. Ltd. is a subsidiary of Shell Can. Resources

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 9 Seam (thermal); Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5533800 N 659500 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3920-84

Ash analysis, per cent:

SiO_2	72.88
Al_2O_3	23.41
Fe_2O_3	0.61
Mn_3O_4	-
TiO_2	1.47
P_2O_5	-
CaO	0.03
MgO	0.58
SO_3	0.40
Na_2O	0.05
K_2O	0.55
SrO	0.01
BaO	0.16
Loss on fusion (LOF)	0.12

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	40
F	79.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1846 m

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 10A Seam (met) 1846 bench; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5533900 N 659400 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3921-84

Rank of coal	Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	0.75		
Ash	%	22.71	22.88	
Volatile	%	19.94	20.09	26.05
Fixed carbon	%	56.60	57.03	73.95
Ultimate:				
Carbon	%	67.66	68.17	88.39
Hydrogen	%	3.97	4.00	5.19
Sulphur (Pyritic)	%	(0.09)	(0.09)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.15)	(0.15)	(0.20)
Total	%	0.24	0.24	–
Nitrogen	%	1.17	1.18	1.53
Ash	%	22.71	22.88	–
Oxygen, by difference	%	3.50	3.53	4.58
Heating value:				
	MJ/kg	27.03	27.24	35.32
	kcal/kg	6457	6506	8436
	Btu/lb	11622	11710	15184

Hardgrove grindability index		76
Free swelling index (FSI)		5.0
Moisture (as rec'd)		
Inherent	%	0.47
Adherent	%	0.28

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Crows Nest Res. Ltd. is a subsidiary of Shell Can. Resources

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 10A Seam (met) 1846 bench; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5533900 N 659400 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3921-84

Ash analysis, per cent:

SiO_2	60.87
Al_2O_3	31.57
Fe_2O_3	1.20
Mn_3O_4	-
TiO_2	1.48
P_2O_5	-
CaO	0.15
MgO	0.73
SO_3	0.58
Na_2O	0.08
K_2O	1.68
SrO	0.04
BaO	-
Loss on fusion (LOF)	0.24

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	30
F	147.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1846 m

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 6 Seam (met) 1846 bench: Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5534300 N 659700 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3922-84
Rank of coal	Medium-volatile bituminous

Proximate analysis:	As Rec'd	Dry	Dry Ash Free
Moisture .... %	0.80		
Ash .... %	15.67	15.80	
Volatile .... %	22.19	22.37	26.57
Fixed carbon .... %	61.34	61.83	73.43
Ultimate:			
Carbon .... %	73.37	73.96	87.84
Hydrogen .... %	4.01	4.04	4.80
Sulphur (Pyritic) .... %	(0.18)	(0.18)	–
(Sulphate) .... %	(0.00)	(0.00)	–
(Organic) .... %	(0.47)	(0.47)	(0.56)
Total .... %	0.64	0.65	–
Nitrogen .... %	1.30	1.31	1.56
Ash .... %	15.67	15.80	–
Oxygen, by difference ...... %	4.21	4.24	5.04
Heating value:			
MJ/kg	29.33	29.56	35.11
kcal/kg	7005	7061	8386
Btu/lb	12608	12710	15095

Hardgrove grindability index	83
Free swelling index (FSI)	2.5
Moisture (as rec'd)	
Inherent .... %	0.54
Adherent .... %	0.26

Ash Fusibility temperature	Reducing	Oxidizing
Initial .... °C	1091	1249
Spherical .... °C	1271	1366
Hemispherical .... °C	1343	1382
Fluid .... °C	1371	1427

Notes: Crows Nest Res. Ltd. is a subsidiary of Shell Can. Resources

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 6 Seam (met) 1846 bench; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5534300 N 659700 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3922-84

Ash analysis, per cent:

SiO_2	49.65
Al_2O_3	19.30
Fe_2O_3	16.73
Mn_3O_4	-
TiO_2	1.07
P_2O_5	2.51
CaO	3.69
MgO	0.67
SO_3	1.88
Na_2O	0.09
K_2O	0.95
SrO	0.04
BaO	0.25
Loss on fusion (LOF)	0.69

Volatile trace element analysis ug/g (ppm)

Hg	0.03
Cl	40
F	277.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1846 m

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 10B Seam (met); Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5533800 N 659500 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3923-84
Rank of coal	Low-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	0.41		
Ash	%	18.26	18.34	
Volatile	%	18.76	18.84	23.07
Fixed carbon	%	62.56	62.82	76.93
Ultimate:				
Carbon	%	72.76	73.06	89.47
Hydrogen	%	3.89	3.91	4.79
Sulphur (Pyritic)	%	(0.04)	(0.04)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.40)	(0.40)	(0.49)
Total	%	0.44	0.44	-
Nitrogen	%	1.03	1.03	1.26
Ash	%	18.26	18.34	-
Oxygen, by difference	%	3.21	3.22	3.94
Heating value:				
	MJ/kg	29.03	29.14	35.69
	kcal/kg	6933	6961	8525
	Btu/lb	12479	12530	15344

Hardgrove grindability index		74
Free swelling index (FSI)		3.0
Moisture (as rec'd)		
Inherent	%	0.36
Adherent	%	0.05

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Crows Nest Res. Ltd. is a subsidiary of Shell Can. Resources

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 10B Seam (met); Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5533800 N 659500 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3923-84

Ash analysis, per cent:

SiO2	65.94
Al2O3	29.53
Fe2O3	0.63
Mn3O4	-
TiO2	1.63
P2O5	0.27
CaO	0.41
MgO	0.10
SO3	-
Na2O	0.02
K2O	0.31
SrO	0.03
BaO	0.30
Loss on fusion (LOF)	1.05

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	40
F	78.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1846 m

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 8 Seam (met); Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5534200 N 659400 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3924-84

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	0.89		
Ash	%	26.56	26.80	
Volatile	%	18.90	19.07	26.05
Fixed carbon	%	53.65	54.13	73.95
Ultimate:				
Carbon	%	63.76	64.33	87.88
Hydrogen	%	3.53	3.56	4.86
Sulphur (Pyritic)	%	(0.09)	(0.09)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.30)	(0.30)	(0.41)
Total	%	0.39	0.39	-
Nitrogen	%	1.09	1.10	1.50
Ash	%	26.56	26.80	-
Oxygen, by difference	%	3.79	3.82	5.22
Heating value:				
	MJ/kg	25.45	25.68	35.08
	kcal/kg	6078	6133	8378
	Btu/lb	10941	11039	15081

Hardgrove grindability index		82
Free swelling index (FSI)		2.0
Moisture (as rec'd)		
Inherent	%	0.68
Adherent	%	0.21

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1402	1468
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Crows Nest Res. Ltd. is a subsidiary of Shell Can. Resources

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 8 Seam (met); Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5534200 N 659400 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3924-84

Ash analysis, per cent:

SiO2	62.37
Al2O3	25.12
Fe2O3	0.91
Mn3O4	-
TiO2	1.37
P2O5	2.08
CaO	2.98
MgO	0.38
SO3	-
Na2O	0.09
K2O	1.79
SrO	0.04
BaO	0.19
Loss on fusion (LOF)	0.53

Volatile trace element analysis ug/g (ppm)

Hg	0.11
Cl	40
F	501.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1834 m

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 9 Seam (met); Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5534200 N 659400 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3925-84

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	0.59		
Ash	%	17.80	17.91	
Volatile	%	20.06	20.18	24.58
Fixed carbon	%	61.55	61.91	75.42
Ultimate:				
Carbon	%	71.92	72.35	88.13
Hydrogen	%	3.96	3.98	4.85
Sulphur (Pyritic)	%	(0.03)	(0.03)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.34)	(0.34)	(0.42)
Total	%	0.37	0.37	-
Nitrogen	%	1.11	1.12	1.36
Ash	%	17.80	17.91	-
Oxygen, by difference	%	4.24	4.27	5.20
Heating value:				
	MJ/kg	28.88	29.05	35.39
	kcal/kg	6898	6939	8453
	Btu/lb	12416	12490	15215

Hardgrove grindability index		82
Free swelling index (FSI)		5.0
Moisture (as rec'd)		
Inherent	%	0.46
Adherent	%	0.13

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Crows Nest Res. Ltd. is a subsidiary of Shell Can. Resources

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 9 Seam (met); Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5534200 N 659400 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3925-84

Ash analysis, per cent:

SiO2	60.80
Al2O3	34.59
Fe2O3	0.57
Mn3O4	-
TiO2	1.70
P2O5	0.40
CaO	0.42
MgO	-
SO3	-
Na2O	0.05
K2O	0.17
SrO	0.07
BaO	0.23
Loss on fusion (LOF)	0.43

Volatile trace element analysis ug/g (ppm)

Hg	0.07
Cl	50
F	97.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 10A Seam (thermal) 1858 bench; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5533700 N 659500 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3926-84

Rank of coal .... Low-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	0.32		
Ash	%	24.41	24.49	
Volatile	%	17.74	17.80	23.57
Fixed carbon	%	57.53	57.71	76.43
Ultimate:				
Carbon	%	66.70	66.91	88.61
Hydrogen	%	3.52	3.53	4.67
Sulphur (Pyritic)	%	(0.05)	(0.05)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.34)	(0.34)	(0.45)
Total	%	0.39	0.39	–
Nitrogen	%	0.87	0.87	1.15
Ash	%	24.41	24.49	–
Oxygen, by difference	%	3.80	3.81	5.05
Heating value:				
	MJ/kg	26.53	26.62	35.25
	kcal/kg	6337	6358	8420
	Btu/lb	11407	11444	15156

Hardgrove grindability index		71
Free swelling index (FSI)		1.0
Moisture (as rec'd)		
Inherent	%	0.32
Adherent	%	

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Crows Nest Res. Ltd. is a subsidiary of Shell Can. Resources

CROWS NEST RESOURCES LTD.
Line Creek Mine; No. 10A Seam (thermal) 1858 bench; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Mine (surface) 5533700 N 659500 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3926-84

Ash analysis, per cent:

SiO_2	68.27
Al_2O_3	25.68
Fe_2O_3	0.55
Mn_3O_4	–
TiO_2	1.51
P_2O_5	0.23
CaO	0.24
MgO	0.12
SO_3	–
Na_2O	0.02
K_2O	0.38
SrO	0.04
BaO	0.30
Loss on fusion (LOF)	3.15

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	40
F	79.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1858 m

CROWS NEST RESOURCES LTD.
Line Creek Mine; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Preparation Plant
Product name	Raw (thermal) Coal Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3928-84

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	2.65		
Ash	%	18.54	19.05	
Volatile	%	19.07	19.59	24.20
Fixed carbon	%	59.73	61.36	75.80
Ultimate:				
Carbon	%	68.60	70.47	87.05
Hydrogen	%	3.58	3.68	4.55
Sulphur (Pyritic)	%	(0.07)	(0.07)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.17)	(0.17)	(0.21)
Total	%	0.23	0.24	-
Nitrogen	%	1.03	1.06	1.31
Ash	%	18.54	19.05	-
Oxygen, by difference	%	5.35	5.50	6.79
Heating value:				
	MJ/kg	27.03	27.77	34.30
	kcal/kg	6456	6632	8192
	Btu/lb	11620	11937	14746

Hardgrove grindability index		75
Free swelling index (FSI)		1.5
Moisture (as rec'd)		
Inherent	%	1.12
Adherent	%	1.53

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Crows Nest Res. Ltd. is a subsidiary of Shell Can. Resources

CROWS NEST RESOURCES LTD.
Line Creek Mine; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Preparation Plant
Product name	Raw (thermal) Coal Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3928-84

Ash analysis, per cent:

SiO_2	57.58
Al_2O_3	31.81
Fe_2O_3	3.48
Mn_3O_4	–
TiO_2	1.52
P_2O_5	0.68
CaO	1.01
MgO	0.43
SO_3	0.15
Na_2O	0.11
K_2O	0.93
SrO	0.04
BaO	0.24
Loss on fusion (LOF)	0.62

Volatile trace element analysis ug/g (ppm)

Hg	0.09
Cl	30
F	169.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CROWS NEST RESOURCES LTD.
Line Creek Mine; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Preparation Plant Sampled from stockpile
Product name	Clean Coal (thermal)
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3919-84

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	2.59		
Ash	%	16.87	17.32	
Volatile	%	20.09	20.62	24.94
Fixed carbon	%	60.45	62.06	75.06
Ultimate:				
Carbon	%	69.35	71.20	86.12
Hydrogen	%	3.68	3.78	4.57
Sulphur (Pyritic)	%	(0.07)	(0.07)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.30)	(0.30)	(0.37)
Total	%	0.36	0.37	-
Nitrogen	%	1.05	1.08	1.31
Ash	%	16.87	17.32	-
Oxygen, by difference	%	6.09	6.25	7.56
Heating value:				
	MJ/kg	27.62	28.35	34.29
	kcal/kg	6596	6772	8190
	Btu/lb	11873	12189	14742

Hardgrove grindability index		77
Free swelling index (FSI)		1.5
Moisture (as rec'd)		
Inherent	%	1.32
Adherent	%	1.27

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Crows Nest Res. Ltd. is a subsidiary of Shell Can. Resources

CROWS NEST RESOURCES LTD.
Line Creek Mine; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Preparation Plant Sampled from stockpile
Product name	Clean Coal (thermal)
Screen opening ,mm	
(Screen opening ,in)	
ERL number	3919-84

Ash analysis, per cent:

SiO2	60.02
Al2O3	30.12
Fe2O3	2.86
Mn3O4	–
TiO2	1.57
P2O5	0.46
CaO	0.90
MgO	0.67
SO3	0.81
Na2O	0.08
K2O	0.88
SrO	0.05
BaO	0.17
Loss on fusion (LOF)	0.28

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	40
F	145.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

CROWS NEST RESOURCES LTD.
Line Creek Mine; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Preparation Plant Sampled from stockpile
Product name	Clean Coal (met.)
Screen opening ,mm	Minus 25
(Screen opening ,in)	Minus 1
ERL number	3927-84

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.84		
Ash	%	8.71	8.87	
Volatile	%	22.39	22.81	25.03
Fixed carbon	%	67.06	68.32	74.97
Ultimate:				
Carbon	%	78.67	80.15	87.95
Hydrogen	%	4.33	4.41	4.84
Sulphur (Pyritic)	%	(0.03)	(0.03)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.43)	(0.44)	(0.49)
Total	%	0.46	0.47	-
Nitrogen	%	1.44	1.47	1.61
Ash	%	8.71	8.87	-
Oxygen, by difference	%	4.54	4.63	5.08
Heating value:				
	MJ/kg	31.86	32.46	35.62
	kcal/kg	7609	7752	8507
	Btu/lb	13697	13954	15312

Hardgrove grindability index		83
Free swelling index (FSI)		5.5
Moisture (as rec'd)		
Inherent	%	0.70
Adherent	%	1.14

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes: Crows Nest Res. Ltd. is a subsidiary of Shell Can. Resources

CROWS NEST RESOURCES LTD.
Line Creek Mine; Elk Valley Coalfield
Sparwood, British Columbia

Sampling date	15-08-84
Sampling location	Preparation Plant Sampled from stockpile
Product name	Clean Coal (met.)
Screen opening ,mm	Minus 25
(Screen opening ,in)	Minus 1
ERL number	3927-84

Ash analysis, per cent:

SiO2	58.64
Al2O3	29.76
Fe2O3	1.97
Mn3O4	–
TiO2	1.93
P2O5	1.37
CaO	1.61
MgO	0.42
SO3	0.25
Na2O	0.09
K2O	0.61
SrO	0.16
BaO	0.38
Loss on fusion (LOF)	0.48

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	30
F	112.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

TECK CORPORATION
Bullmoose Mine; A-2 (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 109+360 N 595+860 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2047-85

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	2.32		
Ash	%	13.05	13.36	
Volatile	%	21.95	22.47	25.93
Fixed carbon	%	62.68	64.17	74.07
Ultimate:				
Carbon	%	75.46	77.25	89.16
Hydrogen	%	3.98	4.07	4.70
Sulphur (Pyritic)	%	(0.07)	(0.07)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.34)	(0.35)	(0.41)
Total	%	0.41	0.42	-
Nitrogen	%	1.10	1.13	1.30
Ash	%	13.05	13.36	-
Oxygen, by difference	%	3.68	3.77	4.35
Heating value:				
	MJ/kg	30.27	30.99	35.77
	kcal/kg	7229	7401	8542
	Btu/lb	13013	13322	15376

Hardgrove grindability index		77
Free swelling index (FSI)		5.0
Moisture (as rec'd)		
Inherent	%	0.63
Adherent	%	1.69

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1154	1246
Spherical	°C	1229	1357
Hemispherical	°C	1393	1371
Fluid	°C	1482+	1479

Notes:

TECK CORPORATION
Bullmoose Mine; A-2 (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 109+360 N 595+860 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2047-85

Ash analysis, per cent:

SiO_2	59.53
Al_2O_3	16.64
Fe_2O_3	9.16
Mn_3O_4	-
TiO_2	1.45
P_2O_5	0.10
CaO	3.29
MgO	1.70
SO_3	2.90
Na_2O	0.49
K_2O	1.20
SrO	0.05
BaO	0.98
Loss on fusion (LOF)	0.80

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	160
F	55.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1337 m

TECK CORPORATION
Bullmoose Mine; No. 6 (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 108+910 N 596+215 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2048-85

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	5.38		
Ash	%	20.98	22.17	
Volatile	%	20.76	21.94	28.19
Fixed carbon	%	52.88	55.89	71.81
Ultimate:				
Carbon	%	64.52	68.19	87.61
Hydrogen	%	3.58	3.78	4.86
Sulphur (Pyritic)	%	(0.09)	(0.09)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.31)	(0.32)	(0.41)
Total	%	0.39	0.41	-
Nitrogen	%	1.07	1.13	1.45
Ash	%	20.98	22.17	-
Oxygen, by difference	%	4.09	4.32	5.55
Heating value:				
	MJ/kg	26.01	27.49	35.32
	kcal/kg	6213	6566	8436
	Btu/lb	11183	11819	15186

Hardgrove grindability index		77
Free swelling index (FSI)		5.0
Moisture (as rec'd)		
Inherent	%	0.72
Adherent	%	4.66

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1318	1338
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

TECK CORPORATION
Bullmoose Mine; No. 6 (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 108+910 N 596+215 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2048-85

Ash analysis, per cent:

SiO2	60.71
Al2O3	22.71
Fe2O3	1.91
Mn3O4	-
TiO2	1.76
P2O5	1.59
CaO	2.60
MgO	1.20
SO3	1.14
Na2O	0.40
K2O	1.76
SrO	0.22
BaO	1.11
Loss on fusion (LOF)	0.58

Volatile trace element analysis ug/g (ppm)

Hg	0.10
Cl	110
F	200.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1411 m

TECK CORPORATION
Bullmoose Mine; B (thermal) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 109+400 N 595+860 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2050-85

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	4.02		
Ash	%	4.36	4.54	
Volatile	%	25.06	26.11	27.35
Fixed carbon	%	66.56	69.35	72.65
Ultimate:				
Carbon	%	79.76	83.10	87.05
Hydrogen	%	4.38	4.56	4.78
Sulphur (Pyritic)	%	(0.03)	(0.03)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.17)	(0.17)	(0.18)
Total	%	0.20	0.21	–
Nitrogen	%	1.26	1.31	1.37
Ash	%	4.36	4.54	–
Oxygen, by difference	%	6.03	6.28	6.58
Heating value:				
	MJ/kg	31.89	33.23	34.81
	kcal/kg	7617	7936	8314
	Btu/lb	13711	14285	14964

Hardgrove grindability index		82
Free swelling index (FSI)		1.0
Moisture (as rec'd)		
Inherent	%	2.42
Adherent	%	1.60

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1232	1274
Spherical	°C	1282	1357
Hemispherical	°C	1343	1421
Fluid	°C	1377	1463

Notes:

TECK CORPORATION
Bullmoose Mine; B (thermal) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 109+400 N 595+860 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2050-85

Ash analysis, per cent:

SiO_2	41.61
Al_2O_3	26.86
Fe_2O_3	8.63
Mn_3O_4	–
TiO_2	2.61
P_2O_5	0.59
CaO	7.78
MgO	1.37
SO_3	2.87
Na_2O	2.30
K_2O	0.48
SrO	0.16
BaO	3.27
Loss on fusion (LOF)	0.74

Volatile trace element analysis ug/g (ppm)

Hg	0.05
Cl	150
F	24.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1437 m

TECK CORPORATION
Bullmoose Mine; E (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 108+425 N 595+970 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2052-85

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	5.93		
Ash	%	18.31	19.46	
Volatile	%	24.67	26.23	32.57
Fixed carbon	%	51.09	54.31	67.43
Ultimate:				
Carbon	%	65.87	70.02	86.94
Hydrogen	%	3.88	4.12	5.12
Sulphur (Pyritic)	%	(0.16)	(0.17)	-
(Sulphate)	%	(0.01)	(0.01)	-
(Organic)	%	(0.32)	(0.34)	(0.43)
Total	%	0.49	0.52	-
Nitrogen	%	1.09	1.16	1.44
Ash	%	18.31	19.46	-
Oxygen, by difference	%	4.44	4.72	5.86
Heating value:				
	MJ/kg	26.69	28.38	35.23
	kcal/kg	6376	6778	8415
	Btu/lb	11476	12200	15148

Hardgrove grindability index		72
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	0.93
Adherent	%	5.00

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1285	1368
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

TECK CORPORATION
Bullmoose Mine; E (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 108+425 N 595+970 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2052-85

Ash analysis, per cent:

SiO_2	58.70
Al_2O_3	23.34
Fe_2O_3	2.74
Mn_3O_4	—
TiO_2	1.13
P_2O_5	0.77
CaO	2.31
MgO	1.70
SO_3	2.19
Na_2O	0.30
K_2O	2.68
SrO	0.14
BaO	0.71
Loss on fusion (LOF)	1.72

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	90
F	191.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1499 m

TECK CORPORATION
Bullmoose Mine; A-1 (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 109+295 N 596+110 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2053-85

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	2.50		
Ash	%	6.52	6.69	
Volatile	%	22.78	23.36	25.03
Fixed carbon	%	68.20	69.95	74.97
Ultimate:				
Carbon	%	81.34	83.42	89.40
Hydrogen	%	4.32	4.43	4.75
Sulphur (Pyritic)	%	(0.03)	(0.03)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.28)	(0.29)	(0.31)
Total	%	0.31	0.32	-
Nitrogen	%	1.19	1.22	1.31
Ash	%	6.52	6.69	-
Oxygen, by difference	%	3.82	3.92	4.20
Heating value:				
	MJ/kg	32.90	33.74	36.16
	kcal/kg	7858	8059	8637
	Btu/lb	14144	14506	15546

Hardgrove grindability index		76
Free swelling index (FSI)		5.0
Moisture (as rec'd)		
Inherent	%	0.66
Adherent	%	1.84

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1179	1232
Spherical	°C	1282	1321
Hemispherical	°C	1404	1402
Fluid	°C	1482+	1482+

Notes:

TECK CORPORATION
Bullmoose Mine; A-1 (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 109+295 N 596+110 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2053-85

Ash analysis, per cent:

SiO_2	58.34
Al_2O_3	16.38
Fe_2O_3	6.19
Mn_3O_4	-
TiO_2	1.79
P_2O_5	0.10
CaO	4.42
MgO	2.15
SO_3	4.53
Na_2O	0.94
K_2O	0.35
SrO	0.11
BaO	1.22
Loss on fusion (LOF)	1.83

Volatile trace element analysis ug/g (ppm)

Hg	0.03
Cl	160
F	24.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1338 m

TECK CORPORATION
Bullmoose Mine; A-1 (thermal) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 109+375 N 595+960 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2054-85

Rank of coal		Medium-volatile bituminous		
Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.17		
Ash	%	5.47	5.53	
Volatile	%	23.26	23.53	24.91
Fixed carbon	%	70.11	70.94	75.09
Ultimate:				
Carbon	%	82.83	83.81	88.72
Hydrogen	%	4.39	4.44	4.70
Sulphur (Pyritic)	%	(0.02)	(0.02)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.28)	(0.28)	(0.30)
Total	%	0.30	0.30	-
Nitrogen	%	1.24	1.25	1.32
Ash	%	5.47	5.53	-
Oxygen, by difference	%	4.62	4.67	4.94
Heating value:				
	MJ/kg	33.49	33.88	35.87
	kcal/kg	7998	8093	8567
	Btu/lb	14397	14567	15420

Hardgrove grindability index		72	
Free swelling index (FSI)		2.5	
Moisture (as rec'd)			
Inherent	%	0.95	
Adherent	%	0.22	
Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1218	1246
Spherical	°C	1416	1443
Hemispherical	°C	1482+	1471
Fluid	°C	1482+	1482+

Notes:

TECK CORPORATION
Bullmoose Mine; A-1 (thermal) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 109+375 N 595+960 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2054-85

Ash analysis, per cent:

SiO_2	65.58
Al_2O_3	15.52
Fe_2O_3	3.87
Mn_3O_4	–
TiO_2	1.61
P_2O_5	0.03
CaO	2.78
MgO	1.12
SO_3	3.21
Na_2O	1.02
K_2O	0.02
SrO	0.11
BaO	1.28
Loss on fusion (LOF)	1.83

Volatile trace element analysis ug/g (ppm)

Hg	0.02
Cl	310
F	15.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1334 m

TECK CORPORATION
Bullmoose Mine; B (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 109+190 N 596+210 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2055-85

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.81		
Ash	%	7.35	7.49	
Volatile	%	25.82	26.30	28.43
Fixed carbon	%	65.01	66.21	71.57
Ultimate:				
Carbon	%	80.13	81.61	88.22
Hydrogen	%	4.41	4.49	4.85
Sulphur (Pyritic)	%	(0.03)	(0.03)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.13)	(0.13)	(0.14)
Total	%	0.16	0.16	-
Nitrogen	%	1.25	1.27	1.37
Ash	%	7.35	7.49	-
Oxygen, by difference	%	4.89	4.98	5.38
Heating value:				
	MJ/kg	32.12	32.71	35.36
	kcal/kg	7672	7813	8446
	Btu/lb	13809	14064	15203

Hardgrove grindability index 81

Free swelling index (FSI) 6.5

Moisture (as rec'd)		
Inherent	%	0.74
Adherent	%	1.07

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1185	1213
Spherical	°C	1238	1241
Hemispherical	°C	1252	1246
Fluid	°C	1310	1293

Notes:

TECK CORPORATION
Bullmoose Mine; B (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 109+190 N 596+210 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2055-85

Ash analysis, per cent:

SiO_2	30.10
Al_2O_3	15.21
Fe_2O_3	5.27
Mn_3O_4	-
TiO_2	1.80
P_2O_5	0.28
CaO	25.61
MgO	3.61
SO_3	5.04
Na_2O	2.28
K_2O	0.16
SrO	0.26
BaO	2.68
Loss on fusion (LOF)	7.36

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	230
F	20.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

TECK CORPORATION
Bullmoose Mine; A-2 (thermal) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 109+375 N 595+960 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2056-85

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.26		
Ash	%	9.92	10.05	
Volatile	%	23.64	23.94	26.61
Fixed carbon	%	65.18	66.01	73.39
Ultimate:				
Carbon	%	79.13	80.14	89.09
Hydrogen	%	4.37	4.43	4.92
Sulphur (Pyritic)	%	(0.04)	(0.04)	-
(Sulphate)	%	(0.00)	(0.00)	-
(Organic)	%	(0.36)	(0.36)	(0.40)
Total	%	0.40	0.41	-
Nitrogen	%	1.10	1.11	1.23
Ash	%	9.92	10.05	-
Oxygen, by difference	%	3.81	3.86	4.29
Heating value:				
	MJ/kg	31.84	32.25	35.85
	kcal/kg	7605	7702	8562
	Btu/lb	13689	13863	15412

Hardgrove grindability index		77
Free swelling index (FSI)		6.5
Moisture (as rec'd)		
Inherent	%	0.72
Adherent	%	0.54

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1299	1399
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

TECK CORPORATION
Bullmoose Mine; A-2 (thermal) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Mine (surface) 109+375 N 595+960 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2056-85

Ash analysis, per cent:

SiO_2	60.37
Al_2O_3	23.47
Fe_2O_3	3.03
Mn_3O_4	–
TiO_2	1.46
P_2O_5	0.28
CaO	2.75
MgO	1.21
SO_3	2.43
Na_2O	0.61
K_2O	0.48
SrO	0.12
BaO	1.19
Loss on fusion (LOF)	1.19

Volatile trace element analysis ug/g (ppm)

Hg	0.04
Cl	250
F	41.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1334 m

TECK CORPORATION
Bullmoose Mine; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Preparation Plant
Product name	Raw Coal Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2049-85

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	5.55		
Ash	%	25.98	27.51	
Volatile	%	20.79	22.01	30.36
Fixed carbon	%	47.68	50.48	69.64
Ultimate:				
Carbon	%	59.33	62.82	86.66
Hydrogen	%	3.44	3.64	5.02
Sulphur (Pyritic)	%	(0.13)	(0.14)	-
(Sulphate)	%	(0.01)	(0.01)	-
(Organic)	%	(0.16)	(0.17)	(0.24)
Total	%	0.30	0.32	-
Nitrogen	%	0.92	0.97	1.34
Ash	%	25.98	27.51	-
Oxygen, by difference	%	4.48	4.74	6.54
Heating value:				
	MJ/kg	23.80	25.20	34.76
	kcal/kg	5685	6019	8303
	Btu/lb	10233	10834	14946

Hardgrove grindability index		75	
Free swelling index (FSI)		5.5	
Moisture (as rec'd)			
Inherent	%	0.76	
Adherent	%	4.79	
Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1332	1343
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

TECK CORPORATION
Bullmoose Mine; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Preparation Plant
Product name	Raw Coal Feed
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2049-85

Ash analysis, per cent:

SiO_2	60.39
Al_2O_3	22.85
Fe_2O_3	2.21
Mn_3O_4	-
TiO_2	1.30
P_2O_5	0.43
CaO	3.08
MgO	1.45
SO_3	2.19
Na_2O	0.46
K_2O	1.72
SrO	0.08
BaO	0.72
Loss on fusion (LOF)	0.91

Volatile trace element analysis ug/g (ppm)

Hg	0.09
Cl	100
F	197.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

TECK CORPORATION
Bullmoose Mine; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	Minus 51
(Screen opening ,in)	Minus 2
ERL number	2051-85

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	5.25		
Ash	%	9.25	9.76	
Volatile	%	24.40	25.75	28.54
Fixed carbon	%	61.11	64.49	71.46
Ultimate:				
Carbon	%	75.63	79.82	88.45
Hydrogen	%	4.21	4.44	4.92
Sulphur (Pyritic)	%	(0.05)	(0.05)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.32)	(0.33)	(0.37)
Total	%	0.36	0.38	–
Nitrogen	%	1.20	1.27	1.41
Ash	%	9.25	9.76	–
Oxygen, by difference	%	4.10	4.33	4.80
Heating value:				
	MJ/kg	30.55	32.24	35.72
	kcal/kg	7296	7699	8532
	Btu/lb	13132	13859	15358

Hardgrove grindability index		79
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	0.74
Adherent	%	4.51

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1207	1254
Spherical	°C	1277	1346
Hemispherical	°C	1379	1391
Fluid	°C	1454	1452

Notes:

TECK CORPORATION
Bullmoose Mine; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	13-09-84
Sampling location	Preparation Plant
Product name	Clean Coal
Screen opening ,mm	Minus 51
(Screen opening ,in)	Minus 2
ERL number	2051-85

Ash analysis, per cent:

SiO2	51.97
Al2O3	21.43
Fe2O3	4.51
Mn3O4	–
TiO2	2.11
P2O5	1.00
CaO	6.27
MgO	2.23
SO3	3.79
Na2O	1.04
K2O	0.69
SrO	0.17
BaO	1.49
Loss on fusion (LOF)	1.25

Volatile trace element analysis ug/g (ppm)

Hg	0.06
Cl	120
F	53.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

DENISON MINES LTD.
Quintette Mine; E (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	14-09-84
Sampling location	Mine (surface) 6099105 N 615370 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2058-85

Rank of coal .... Medium-volatile bituminous

		As Rec'd	Dry	Dry Ash Free
Proximate analysis:				
Moisture	%	1.96		
Ash	%	17.91	18.27	
Volatile	%	22.65	23.10	28.26
Fixed carbon	%	57.48	58.63	71.74
Ultimate:				
Carbon	%	71.28	72.71	88.96
Hydrogen	%	4.02	4.10	5.02
Sulphur (Pyritic)	%	(0.10)	(0.10)	–
(Sulphate)	%	(0.00)	(0.00)	–
(Organic)	%	(0.21)	(0.21)	(0.26)
Total	%	0.31	0.32	–
Nitrogen	%	0.99	1.01	1.24
Ash	%	17.91	18.27	–
Oxygen, by difference	%	3.52	3.59	4.39
Heating value:				
	MJ/kg	28.66	29.24	35.77
	kcal/kg	6846	6983	8544
	Btu/lb	12323	12570	15380

Hardgrove grindability index		77
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	0.68
Adherent	%	1.28

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1310	1263
Spherical	°C	1482+	1413
Hemispherical	°C	1482+	1463
Fluid	°C	1482+	1482+

Notes: Top 2/3 of "E" Seam sampled (without parting)

DENISON MINES LTD.
Quintette Mine; E (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	14-09-84
Sampling location	Mine (surface) 6099105 N 615370 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2058-85

Ash analysis, per cent:

SiO_2	59.85
Al_2O_3	23.04
Fe_2O_3	2.47
Mn_3O_4	–
TiO_2	1.13
P_2O_5	0.25
CaO	3.69
MgO	1.28
SO_3	2.70
Na_2O	0.62
K_2O	1.76
SrO	0.07
BaO	0.50
Loss on fusion (LOF)	1.05

Volatile trace element analysis ug/g (ppm)

Hg	0.02
Cl	110
F	175.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1676 m

DENISON MINES LTD.
Quintette Mine; J (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	14-09-84
Sampling location	Mine (surface) 6099050 N 615225 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2061-85

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	1.77		
Ash	%	14.56	14.82	
Volatile	%	22.85	23.26	27.31
Fixed carbon	%	60.82	61.92	72.69
Ultimate:				
Carbon	%	74.00	75.34	88.45
Hydrogen	%	4.15	4.22	4.95
Sulphur (Pyritic)	%	(0.05)	(0.05)	-
(Sulphate)	%	(0.01)	(0.01)	-
(Organic)	%	(0.21)	(0.21)	(0.25)
Total	%	0.27	0.27	-
Nitrogen	%	1.05	1.07	1.26
Ash	%	14.56	14.82	-
Oxygen, by difference	%	4.20	4.28	5.02
Heating value:				
	MJ/kg	29.74	30.28	35.55
	kcal/kg	7104	7232	8491
	Btu/lb	12787	13018	15283

Hardgrove grindability index		81
Free swelling index (FSI)		7.0
Moisture (as rec'd)		
Inherent	%	0.66
Adherent	%	1.11

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1482+	1482+
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

DENISON MINES LTD.
Quintette Mine; J (met) Seam; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	14-09-84
Sampling location	Mine (surface) 6099050 N 615225 E
Product name	Channel Sample
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2061-85

Ash analysis, per cent:

SiO_2	50.85
Al_2O_3	31.51
Fe_2O_3	2.22
Mn_3O_4	–
TiO_2	1.37
P_2O_5	0.18
CaO	4.00
MgO	1.38
SO_3	3.29
Na_2O	0.54
K_2O	0.17
SrO	0.08
BaO	0.52
Loss on fusion (LOF)	1.51

Volatile trace element analysis ug/g (ppm)

Hg	0.13
Cl	70
F	51.
Br	–
As	–
Se	–

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes: Sample Elevation = 1690 m

DENISON MINES LTD.
Quintette Mine; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	14-09-84
Sampling location	Preparation Plant
Product name	Raw Coal Feed (met)
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2057-85

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	4.82		
Ash	%	32.80	34.46	
Volatile	%	18.29	19.22	29.33
Fixed carbon	%	44.09	46.32	70.67
Ultimate:				
Carbon	%	54.93	57.71	88.05
Hydrogen	%	3.08	3.24	4.94
Sulphur (Pyritic)	%	(0.20)	(0.21)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.08)	(0.08)	(0.12)
Total	%	0.29	0.30	–
Nitrogen	%	0.72	0.76	1.16
Ash	%	32.80	34.46	–
Oxygen, by difference	%	3.36	3.53	5.39
Heating value:				
	MJ/kg	21.69	22.78	34.76
	kcal/kg	5179	5442	8303
	Btu/lb	9323	9795	14945

Hardgrove grindability index		77
Free swelling index (FSI)		3.0
Moisture (as rec'd)		
Inherent	%	0.74
Adherent	%	4.08

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1252	1299
Spherical	°C	1416	1482+
Hemispherical	°C	1479	1482+
Fluid	°C	1482+	1482+

Notes:

DENISON MINES LTD.
Quintette Mine; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	14-09-84
Sampling location	Preparation Plant
Product name	Raw Coal Feed (met)
Screen opening ,mm	
(Screen opening ,in)	
ERL number	2057-85

Ash analysis, per cent:

SiO2	64.52
Al2O3	18.53
Fe2O3	2.70
Mn3O4	—
TiO2	0.92
P2O5	0.11
CaO	3.48
MgO	1.66
SO3	1.88
Na2O	0.45
K2O	2.69
SrO	0.04
BaO	0.34
Loss on fusion (LOF)	1.11

Volatile trace element analysis ug/g (ppm)

Hg	0.10
Cl	80
F	252.
Br	—
As	—
Se	—

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

DENISON MINES LTD.
Quintette Mine; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	14-09-84
Sampling location	Preparation Plant
Product name	Clean Coal (thermal)
Screen opening ,mm	Minus 51
(Screen opening ,in)	Minus 2
ERL number	2059-85

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	6.80		
Ash	%	11.88	12.75	
Volatile	%	21.52	23.09	26.46
Fixed carbon	%	59.79	64.16	73.54
Ultimate:				
Carbon	%	70.66	75.82	86.90
Hydrogen	%	3.77	4.05	4.64
Sulphur (Pyritic)	%	(0.06)	(0.06)	-
(Sulphate)	%	(0.01)	(0.01)	-
(Organic)	%	(0.27)	(0.29)	(0.34)
Total	%	0.34	0.37	-
Nitrogen	%	0.97	1.04	1.19
Ash	%	11.88	12.75	-
Oxygen, by difference	%	5.56	5.97	6.84
Heating value:				
	MJ/kg	28.17	30.23	34.64
	kcal/kg	6728	7219	8274
	Btu/lb	12111	12995	14894

Hardgrove grindability index		78
Free swelling index (FSI)		1.0
Moisture (as rec'd)		
Inherent	%	1.30
Adherent	%	5.50

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1274	1307
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

DENISON MINES LTD.
Quintette Mine; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	14-09-84
Sampling location	Preparation Plant
Product name	Clean Coal (thermal)
Screen opening ,mm	Minus 51
(Screen opening ,in)	Minus 2
ERL number	2059-85

Ash analysis, per cent:

SiO_2	60.05
Al_2O_3	22.29
Fe_2O_3	3.27
Mn_3O_4	-
TiO_2	1.31
P_2O_5	0.49
CaO	3.80
MgO	1.20
SO_3	2.15
Na_2O	0.58
K_2O	1.38
SrO	0.14
BaO	0.64
Loss on fusion (LOF)	0.76

Volatile trace element analysis ug/g (ppm)

Hg	0.11
Cl	80
F	98.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

DENISON MINES LTD.
Quintette Mine; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	14-09-84
Sampling location	Preparation Plant
Product name	Clean Coal (met)
Screen opening ,mm	Minus 51
(Screen opening ,in)	Minus 2
ERL number	2060-85

Rank of coal .... Medium-volatile bituminous

Proximate analysis:		As Rec'd	Dry	Dry Ash Free
Moisture	%	7.99		
Ash	%	10.26	11.15	
Volatile	%	21.58	23.45	26.39
Fixed carbon	%	60.18	65.40	73.61
Ultimate:				
Carbon	%	72.45	78.74	88.62
Hydrogen	%	3.96	4.30	4.84
Sulphur (Pyritic)	%	(0.07)	(0.08)	–
(Sulphate)	%	(0.01)	(0.01)	–
(Organic)	%	(0.27)	(0.29)	(0.33)
Total	%	0.35	0.38	–
Nitrogen	%	1.02	1.11	1.25
Ash	%	10.26	11.15	–
Oxygen, by difference	%	3.97	4.32	4.86
Heating value:				
	MJ/kg	29.12	31.65	35.62
	kcal/kg	6955	7559	8507
	Btu/lb	12519	13606	15313

Hardgrove grindability index		80
Free swelling index (FSI)		5.0
Moisture (as rec'd)		
Inherent	%	0.94
Adherent	%	7.05

Ash Fusibility temperature		Reducing	Oxidizing
Initial	°C	1257	1321
Spherical	°C	1482+	1482+
Hemispherical	°C	1482+	1482+
Fluid	°C	1482+	1482+

Notes:

DENISON MINES LTD.
Quintette Mine; Peace River Coalfield
Tumbler Ridge, British Columbia

Sampling date	14-09-84
Sampling location	Preparation Plant
Product name	Clean Coal (met)
Screen opening ,mm	Minus 51
(Screen opening ,in)	Minus 2
ERL number	2060-85

Ash analysis, per cent:

SiO2	57.44
Al2O3	23.13
Fe2O3	4.11
Mn3O4	-
TiO2	1.39
P2O5	0.39
CaO	3.78
MgO	1.46
SO3	2.48
Na2O	0.66
K2O	1.40
SrO	0.10
BaO	0.67
Loss on fusion (LOF)	1.01

Volatile trace element analysis ug/g (ppm)

Hg	0.09
Cl	100
F	103.
Br	-
As	-
Se	-

Non-volatile trace element analysis ug/g (ppm)

Ba	
Sr	
V	
Mn	
Cr	

Notes:

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the assistance of their co-workers in the collection, preparation and analysis of the coal samples used in this report.

Sample collection was conducted by H.G. Naidu, D.J. O'Brien, V. Srajer and K. Karr in Saskatchewan, Alberta and British Columbia. Sample collection in Nova Scotia and New Brunswick was conducted by D.J. O'Brien, H.G. Naidu, G. Corbett, D. Young and G. Bonnell.

Sample preparation for the western coals were performed by T.A. Lloyd and K. Graham. Sample preparation for the eastern coals was conducted by G. Corbett, D. Young and G. Bonnell.

Sample analyses for the eastern coals were performed in both the Cape Breton Coal Research Laboratory in Sydney and the Energy Research Laboratories in Ottawa. (In the Sydney Laboratory the following analyses were done by G. Corbett, D. Young and G. Bonnell: proximates, total sulphurs, heating values and FSI's.) All the remaining analyses for the eastern coals were done in the Ottawa Laboratory. Analyses for the western coals were done entirely at the Energy Research Laboratories in Ottawa. Proximate analyses and FSI's were done by E. Bonvie. Ultimate analyses and equilibrium moistures were done by D. Rioux. Total sulphurs and sulphur forms were done by T. Psuika and J. Glasa. Heating values were done by J. Glasa. Hardgrove grindability indexes were done by K. Graham and T.A. Lloyd. F.P.A.'s and trace mercuries were done by H. Koethe. Ash analyses were done by T. Moher and P. Zourdos. Trace chlorine and florine analyses were done by J. Skulski.

Special thanks to H.G. Naidu and D.J. O'Brien for making sure proper sampling procedures were followed and for the collection of pertinent information necessary for this report. Special thanks to J. Glasa for keeping the authors supplied with analysis results as they became available. Special thanks to A.S. Romaniuk (project leader) who provided advice in putting this report together, and to H.G. Naidu and D.J. O'Brien for providing the raw coal production statistics.

REFERENCES

1. Swartzman, E. "Analysis Directory of Canadian Coals"; 2nd edition; Report 836; EMR, Mines Branch (since named CANMET), Fuels Division; 1953.
2. Swartzman, E. and Tibbetts, T.E. ibid, Supplement No. 1; Report 850; EMR, Mines Branch, Fuels Division; 1955.
3. Tibbetts, T.E. and Montgomery, W.J. ibid, Supplement No. 2; Monograph 868; EMR, Mines Branch, Fuels and Mining Practice Division; 1960.
4. Tibbetts, T.E. and Montgomery, W.J. and Faurschou, D.K. "Analysis Directory of Canadian Commerical Coals - Supplement No. 3"; CANMET Report 79-7; CANMET, EMR; December 1978.
5. Faurschou, D.K., Bonnell, G.W. and Janke, L.C. "Analysis Directory of Canadian Commercial Coals - Supplement No. 4"; CANMET Report 82-13E; CANMET, EMR; June 1982.
6. Bonnell, G.W., Janke, L.C. and Romaniuk, A.S. "Analysis Directory of Canadian Commercial Coals - Supplement No. 5"; CANMET Report 84-1E; CANMET, EMR; November 1983.
7. "Operators list 4, coal mines in Canada"; Energy, Mines and Resources; DSS Cat. No. M36-79/4; January 1979.
8. Bielenstein, H.U., Chrismas, L.P., Latour, B.A. and Tibbetts, T.E. "Coal Resources and Reserves of Canada"; EMR, Report ER 79-9; December 1979.
9. "1976 Assessment of Canada's Coal Resources and Reserves"; EMR, Report EP 77-5 (DSS Cat. No. M23-12/77-5); 1977.
10. Romaniuk, A.S. and Naidu, H.G. "Coal Mining in Canada: 1983"; CANMET Report 83-20E; CANMET, EMR; March 1984.

Table 1 - Summary classification of coal by rank

VM*	FC*	Class	Group (rank)	Calorific value**	
%	%			Btu/lb	MJ/kg
2	98 -		Meta - Anthracite		
8	92 -	Anthracitic[1]	Anthracite		
14	86		Semianthracite		
22	78 -		Low-volatile bituminous		
			Medium-volatile bituminous		
31	69 -	Bituminous[2]	High-volatile A bituminous	14 000	32.6
			High-volatile B bituminous	13 000	30.2
			High-volatile C bituminous	11 500	26.7
			Subbituminous A[3]	10 500	24.4
		Subbituminous[4]	Subbituminous B	9 500	22.1
			Subbituminous C	8 300	19.3
			Lignite A	6 300	14.7
		Lignite[4]	Lignite B		

*Dry, mineral-mater-free basis; VM = Volatile matter; FC = Fixed carbon.

**Moist, mineral-matter-free basis.

[1] Nonagglomerating; if agglomerating, classified as low-volatile bituminous.

[2] Commonly agglomerating.

[3] If agglomerating, classified as high-volatile C bituminous.

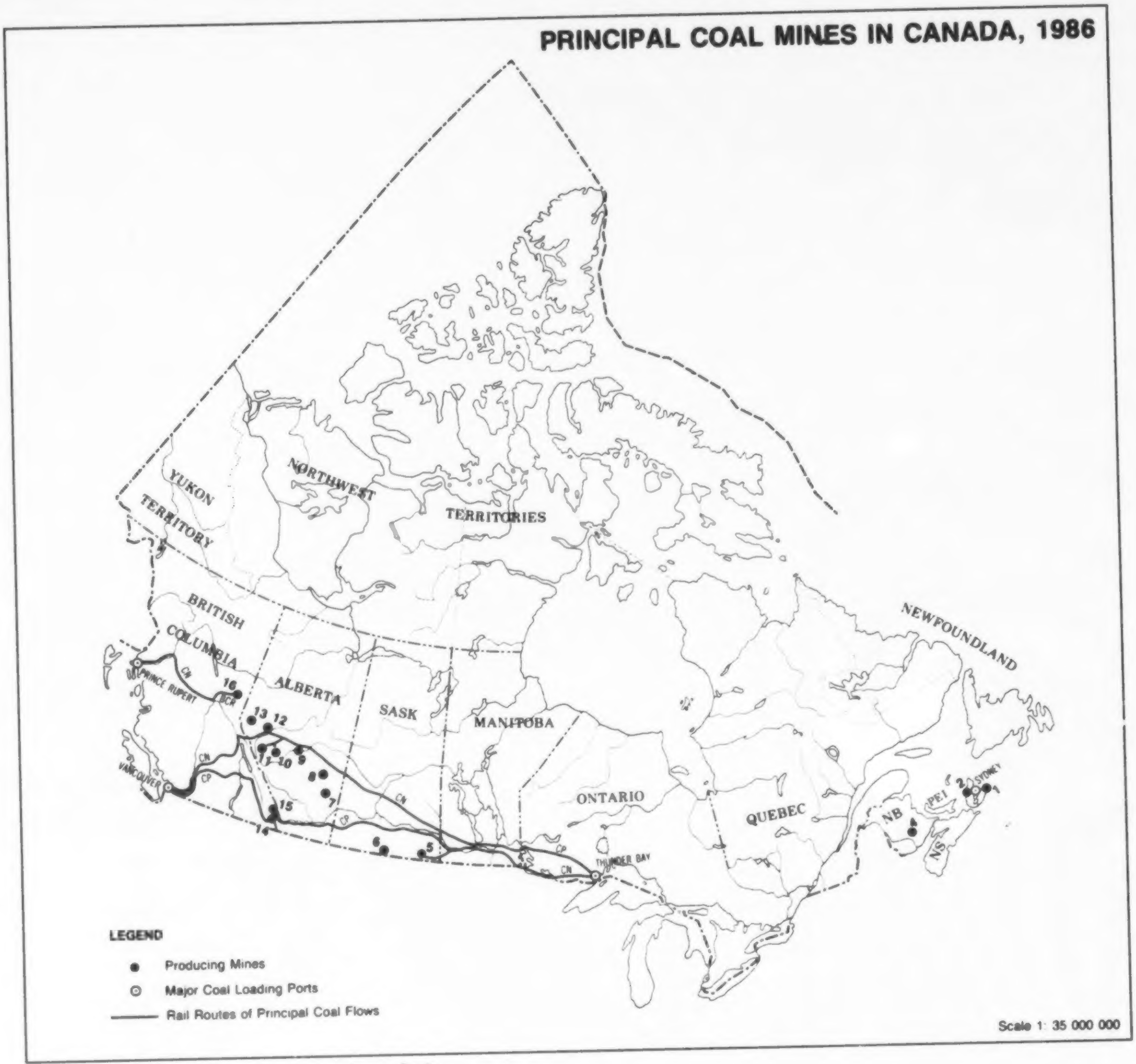
[4] Nonagglomerating.

Table 2 - Some of the mines sampled and their approximate raw coal production for 1985 (in thousands of tonnes)

	($x 10^3$ tonnes)
NOVA SCOTIA	
Inverness Coalfield	
St. Rose Mine (Evans Coal Mines Ltd.)	29
Pictou Coalfield	
Pioneer Coal Company Limited (u/g & sfce)	n/a
Sydney Coalfield	
Lingan Mine (Cape Breton Development Corp.)	1,906
Prince Mine (Cape Breton Development Corp.)	994
Brogans Mine (Thomas Brogan & Sons Const. Ltd.)	33
Selminco (Coal Reclamation, Sydney Mines)	50
Selminco (Coal Reclamation, New Waterford)	108
NEW BRUNSWICK	
Minto Coalfield	
Minto/Chipman Area Pits (N.B. Coal Ltd.)	560
SASKATCHEWAN	
Estevan Coalfield	
Bienfait Mine (Bienfait Coal Co. Ltd.)	1,386
Boundary Dam Mine (M & S Coal Co. Ltd.)	2,087
Costello Mine (Manalta Coal Ltd.)	294
Utility Mine (Manalta Coal Ltd.)	2,404
Willow Bunch Coalfield	
Poplar River Mine (Manalta Coal Ltd.)	3,800
ALBERTA (PLAINS REGION)	
Battle River Coalfield	
Diplomat Mine (Forestburg Collieries Ltd.)	62
Paintearth Mine (Forestburg Collieries Ltd.)	1,539
Vesta Mine (Manalta Coal Ltd.)	1,143
Sheerness Coalfield	
Montgomery Mine (Manalta Coal Ltd.)	296
Wabamun Coalfield	
Highvale Mine (Manalta Coal Ltd.)	11,842
Whitewood Mine (Manalta Coal Ltd.)	1,950

Table 2 - Some of the mines sampled and their approximate raw coal production for 1985 (in thousands of tonnes)(cont'd)

	(x 10^3 tonnes)
ALBERTA (FOOTHILLS AND MOUNTAIN REGIONS)	
Coalspur Coalfield	
Coal Valley Mine (Luscar Ltd.)	3,300
Cadomin-Luscar Coalfield	
Luscar Mine (Cardinal River Coals Ltd.)	2,390
Gregg River Mine (Gregg River Res. Ltd.)	2,837
Smoky River Coalfield	
Mine 1774 (Smoky River Coal Ltd.) (sfce)	897
Mines 1765/09/A,B,G (Smoky River Coals Ltd.) (u/g)	494
Obed Marsh Coalfield	
Obed-Marsh Mine (Obed Mountain Coal Co.)	1,356
BRITISH COLUMBIA	
Crowsnest Coalfield	
Coal Mountain Mine (Byron Creek Collieries Ltd.)	1,173
Michel Underground Mine (Westar Mining Ltd.)	190
Harmer Surface Mine (Westar Mining Ltd.)	9,020
Elk Valley Coalfield	
Greenhills Mine (Westar Mining Ltd.)	3,089
Fording River Mine (Fording Coal Ltd.)	6,480
Line Creek Mine (Crows Nest Resources Ltd.)	2,780
Peace River Coalfield	
Bullmoose Mine (Teck Corp.)	2,857
Quintette Mine (Denison Mines Ltd.)	10,095



PRINCIPAL COAL MINES IN CANADA, 1986

YUKON TERRITORY
NORTHWEST TERRITORIES
BRITISH COLUMBIA
ALBERTA
SASK
MANITOBA
ONTARIO
QUEBEC
NEWFOUNDLAND
NB
PEI
NS
PRINCE RUPERT
VANCOUVER
THUNDER BAY
SYDNEY
CN
CP
1
2
4
5
6
7
8
9
10
11
12
13
14
15
16
LEGEND
● Producing Mines
⊙ Major Coal Loading Ports
Rail Routes of Principal Coal Flows
Scale 1: 35 000 000

Produced by the Surveys and Mapping Branch, Energy, Mines and Resources Canada

INDEX FOR MAP

Nova Scotia
(bituminous coal)
1. Lingan Mine (Cape Breton Development Corporation)
   Prince Mine (Cape Breton Development Corporation)
   Point Aconi Pit (Novaco Ltd.)
2. St. Rose Mine (Evans Coal Mines Ltd.)

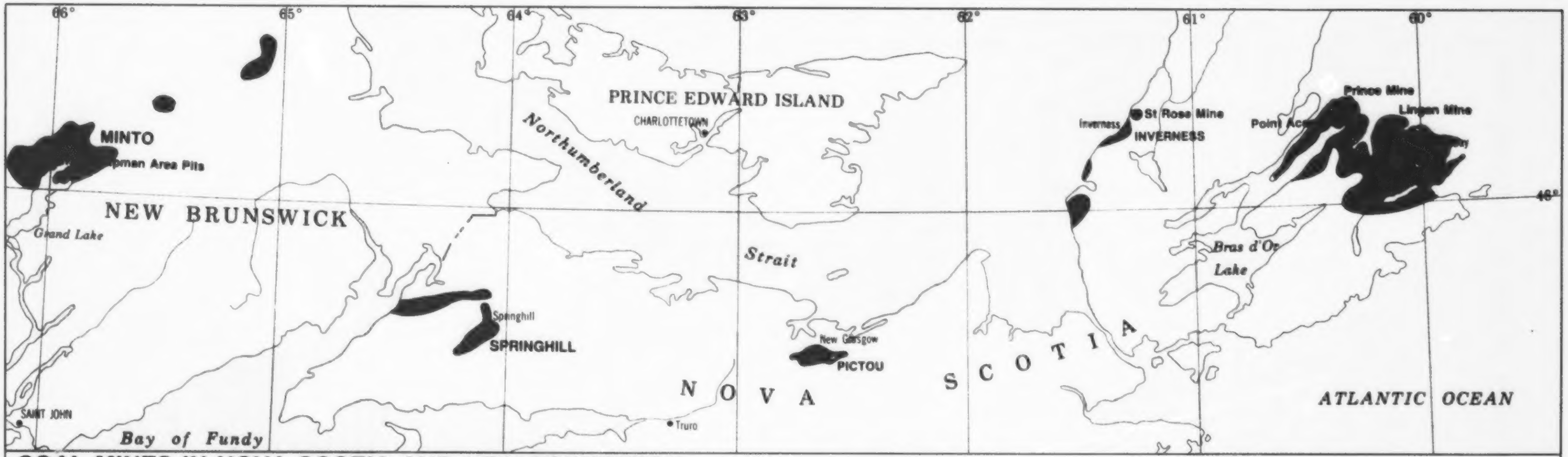
New Brunswick
(bituminous coal)
4. (Minto / Chipman Area Pits (N. B. Coal Ltd.)

Saskatchewan
(lignitic coal)
5. Bienfait Mine (Bienfait Coal Co.)
   Boundary Dam Mine (M & S Coal Co.)
   Costello Mine (formerly Klimax Mine) (Manalta Coal Ltd.)
   Utility Mine (Saskatchewan Power Corporation, with Manalta as operator)
6. Poplar River Mine (Manalta Coal Ltd.)

Alberta
(subbituminous coal)
7. Montgomery Mine (formerly Roselyn Mine) (Manalta Coal Ltd.)
8. Vesta Mine (Alberta Power Limited, with Manalta as operator)
   Diplomat Mine (Forestburg Collieries Ltd.)
   Paintearth Mine (Forestburg Collieries Ltd.)
9. Highvale Mine (TransAlta Utilities Corporation, with Manalta as operator
   Whitewood Mine (TransAlta Utilities Corporation, with Manalta as operator)

(bituminous coal)
10. Coal Valley Mine (Luscar Sterco Ltd.)
11. Luscar Mine (Cardinal River Coals Ltd.)
    Gregg River Mine (Manalta Coal Ltd.)
12. Obed-Marsh Mine (Union Oil Company of Canada Limited)
13. No. 1765 Mine (underground) (Smoky River Coals Ltd.)
    No. 1774 Mine (surface) (Smoky River Coals Ltd.)

British Columbia
(bituminous coal)
14. Corbin Mine (Byron Creek Collieries Limited)
    Harmer Surface Mine (Westar Mining Ltd.)
    Michel Underground Mine (Westar Mining Ltd.)
15. Line Creek Mine (Crows Nest Resources Limited)
    Fording River Mine (Fording Coal Ltd.)
    Greenhills Mine (Westar Mining Ltd.)
16. Quintette Mine (Denison Mines Limited and others)
    Bullmoose Mine (Teck Corporation and others)


66°
65°
64°
63°
62°
61°
60°
46°
MINTO
pman Area Pits
NEW BRUNSWICK
Grand Lake
SAINT JOHN
Bay of Fundy
Northumberland
Strait
PRINCE EDWARD ISLAND
CHARLOTTETOWN
Springhill
SPRINGHILL
New Glasgow
PICTOU
Truro
N O V A S C O T I A
Inverness
St Rose Mine
INVERNESS
Prince Mine
Point Ac
Lingan Mine
Bras d'Or Lake
ATLANTIC OCEAN

COAL MINES IN NOVA SCOTIA AND NEW BRUNSWICK

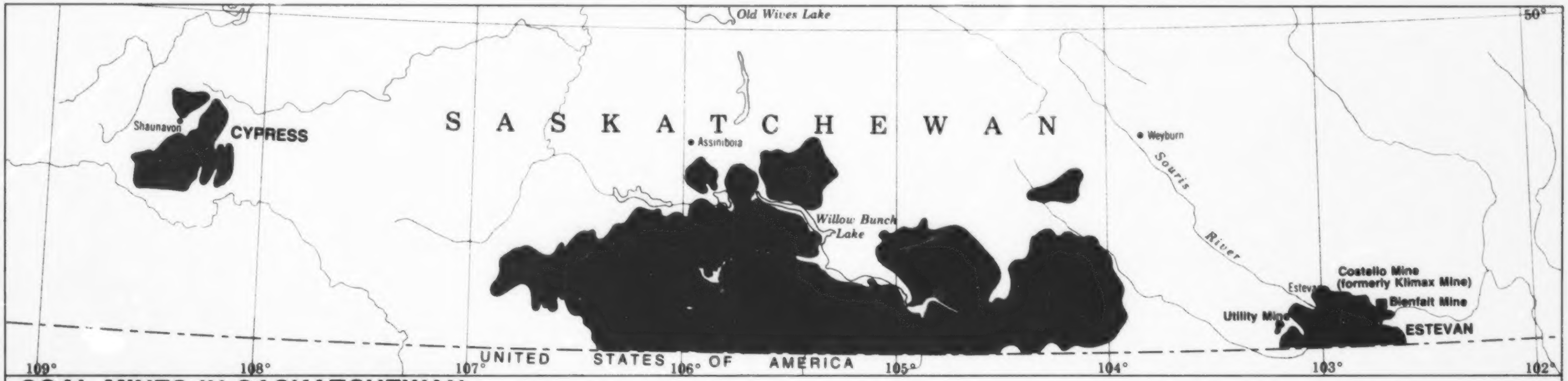
Coal Mines ■ surface ● underground

Coal Fields ●

Scale 1: 2 000 000

kilometres 20 0 20 40 60 80 100

Produced by the Surveys and Mapping Branch, Energy, Mines and Resources Canada.


Old Wives Lake
50°
Shaunavon
CYPRESS
S A S K A T C H E W A N
Assiniboia
Willow Bunch Lake
Weyburn
Souris River
Estev
Costello Mine (formerly Klimax Mine)
Bienfait Mine
Utility Mine
ESTEVAN
UNITED STATES OF AMERICA
109°
108°
107°
106°
105°
104°
103°
102°

COAL MINES IN SASKATCHEWAN

Coal Mines ■ surface ● underground

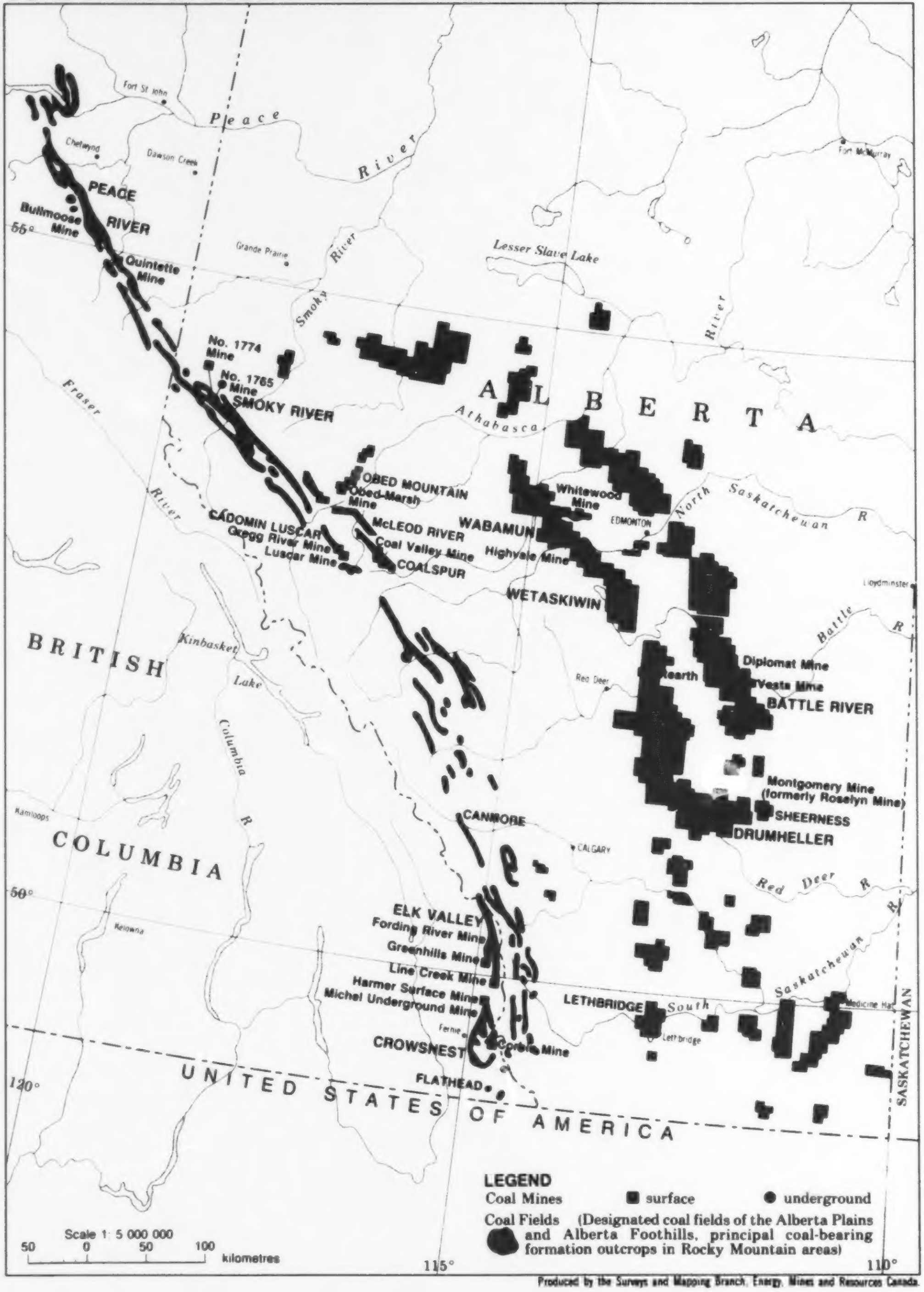
Coal Fields ●

Scale 1: 2 000 000

kilometres 20 0 20 40 60 80 100

Produced by the Surveys and Mapping Branch, Energy, Mines and Resources Canada.

COAL MINES IN ALBERTA AND BRITISH COLUMBIA


Fort St John
Peace River
Chetwynd
Dawson Creek
PEACE RIVER
Bullmoose Mine
55°
Quintette Mine
Grande Prairie
Smoky River
Lesser Slave Lake
Fort McMurray
River
No. 1774 Mine
No. 1765 Mine
SMOKY RIVER
Fraser River
ALBERTA
Athabasca
OBED MOUNTAIN
Obed-Marsh Mine
CADOMIN LUSCAR
Gregg River Mine
Luscar Mine
McLEOD RIVER
Coal Valley Mine
COALSPUR
Whitewood Mine
WABAMUN
EDMONTON
Highvale Mine
North Saskatchewan R
WETASKIWIN
Lloydminster
Battle R
BRITISH COLUMBIA
Kinbasket Lake
Columbia R
Red Deer
Paintearth
Diplomat Mine
Vesta Mine
BATTLE RIVER
Montgomery Mine (formerly Roselyn Mine)
SHEERNESS
DRUMHELLER
Kamloops
CANMORE
CALGARY
Red Deer R
50°
Kelowna
ELK VALLEY
Fording River Mine
Greenhills Mine
Line Creek Mine
Harmer Surface Mine
Michel Underground Mine
LETHBRIDGE
Lethbridge
South Saskatchewan R
Medicine Hat
SASKATCHEWAN
Fernie
CROWSNEST
Corbin Mine
FLATHEAD
120°
UNITED STATES OF AMERICA
115°
110°
LEGEND
Coal Mines
■ surface
● underground
Coal Fields (Designated coal fields of the Alberta Plains and Alberta Foothills, principal coal-bearing formation outcrops in Rocky Mountain areas)
Scale 1: 5 000 000
50
0
50
100
kilometres

Produced by the Surveys and Mapping Branch, Energy, Mines and Resources Canada.